✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Stiles P.L., Dieringer J.A., Shah N.C., Van Duyne R.P.

✓ **خلاصه پژوهش:**

The ability to control the size, shape, and material of a surface has reinvigorated the field of surface-enhanced Raman spectroscopy (SERS). Because excitation of the localized surface plasmon resonance of a nanostructured surface or nanoparticle lies at the heart of SERS, the ability to reliably control the surface characteristics has taken SERS from an interesting surface phenomenon to a rapidly developing analytical tool. This article first explains many fundamental features of SERS and then describes the use of nanosphere lithography for the fabrication of highly reproducible and robust SERS substrates. In particular, we review metal film over nanosphere surfaces as excellent candidates for several experiments that were once impossible with more primitive SERS substrates (e.g., metal island films). The article also describes progress in applyingSERSto the detection of chemical warfare agents and several biological molecules. Copyright © 2008 by Annual Reviews.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1146/annurev.anchem.1.031207.112814

✓ **نام ژورنال:**

Annual Review of Analytical Chemistry

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

2352

✓ **عنوان پژوهش:**

Surface-enhanced raman spectroscopy: Concepts and chemical applications

✓ **نویسندگان:**

Schlücker S.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has become a mature vibrational spectroscopic technique during the last decades and the number of applications in the chemical, material, and in particular life sciences is rapidly increasing. This Review explains the basic theory of SERS in a brief tutorial and - based on original results from recent research - summarizes fundamental aspects necessary for understanding SERS and provides examples for the preparation of plasmonic nanostructures for SERS. Chemical applications of SERS are the centerpiece of this Review. They cover a broad range of topics such as catalysis and spectroelectrochemistry, single-molecule detection, and (bio)analytical chemistry. Expanding vibrational spectroscopy: Since its first observation in 1973, surface-enhanced Raman scattering (SERS) has developed into a mature vibrational spectroscopic technique. The number of applications in chemistry as well as the material and life sciences is increasing rapidly. This Review summarizes the key concepts behind SERS and provides an overview of current applications in chemistry. © 2014 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/anie.201205748

✓ **نام ژورنال:**

Angewandte Chemie - International Edition

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

1552

✓ **عنوان پژوهش:**

SERS: Materials, applications, and the future

✓ **نویسندگان:**

Sharma B., Frontiera R.R., Henry A.-I., Ringe E., Van Duyne R.P.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) is a powerful vibrational spectroscopy technique that allows for highly sensitive structural detection of low concentration analytes through the amplification of electromagnetic fields generated by the excitation of localized surface plasmons. SERS has progressed from studies of model systems on roughened electrodes to highly sophisticated studies, such as single molecule spectroscopy. We summarize the current state of knowledge concerning the mechanism of SERS and new substrate materials. We highlight recent applications of SERS including sensing, spectroelectrochemistry, single molecule SERS, and real-world applications. We also discuss contributions to the field from the Van Duyne group. This review concludes with a discussion of future directions for this field including biological probing with UV-SERS, tip-enhanced Raman spectroscopy, and ultrafast SERS. © 2012 Elsevier Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/S1369-7021(12)70017-2

✓ **نام ژورنال:**

Materials Today

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

1519

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering

✓ **نویسندگان:**

Otto A., Mrozek I., Grabhorn H., Akemann W.

✓ **خلاصه پژوهش:**

On the basis of different types of experiments, the authors develop implicitly the model of surface-enhanced Raman scattering (SERS) of adsorbates on metal surfaces. The long-range enhancement by resonances of the macroscopic laser and Stokes field is separated quantitatively from the metal electron-mediated resonance Raman effect. The latter mechanism proceeds by increased electron-photon coupling at an atomically rough surface and by temporary charge transfer to orbitals of the adsorbates. This model can account for the chemical specificity and vibrational selectivity of SERS and (partly) for the SERS specificity of the various metals.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1088/0953-8984/4/5/001

✓ **نام ژورنال:**

Journal of Physics: Condensed Matter

✓ **سال انتشار:**

1992

✓ **تعداد ارجاعات:**

1432

TEKSAN
Detect Precisely

✓ عنوان پژوهش:

Surface-enhanced Raman scattering: From noble to transition metals and from rough surfaces to ordered nanostructures

✓ نویسندگان:

Tian Z.-Q., Ren B., Wu D.-Y.

✓ خلاصه پژوهش:

In the mid-1970s, surface-enhanced Raman scattering (SERS) was discovered which impacted on surface science and spectroscopy because of its extremely high surface sensitivity. However, SERS had not developed as many people had hoped to be a powerful surface diagnostic technique that can be widely used because of some obstacles. For example, only three noble metals Au, Ag, and Cu could provide large enhancement, severely limiting the widespread applications involving other metallic materials of both fundamental and practical importance. In this article, emphasis is put on the recent work of our group to directly generate SERS on net transition metals (e.g., Pt, Ru, Rh, Pd, Fe, Co, Ni, and their alloys) by developing various roughening procedures and optimizing the performance of the confocal Raman microscope. An approach of replacing the randomly roughened surface with ordered nanorod arrays of transition metals is introduced as a promising class of highly SERS-active substrates. The surface enhancement factor for transition metals was calculated, which ranged from 1 to 4 orders of magnitude. The applications of SERS in surface adsorption, electro-catalysis, and corrosion of transition-metal-based systems demonstrated several advantages of in situ surface Raman spectroscopy. A preliminary theoretical approach, considering the electromagnetic and chemical contributions, is presented to explain the SERS behavior of transition metal electrodes and nanorod arrays. It has been shown that SERS together with other surface-enhanced optical phenomena could be one of important issues not only in surface science but also in nanoscale science. Prospects and further developments in this exciting field are discussed with emphasis on the emerging experimental methodology.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1021/jp0257449

✓ نام ژورنال:

Journal of Physical Chemistry B

✓ سال انتشار:

2002

✓ تعداد ارجاعات:

1223

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering and biophysics

✓ **نویسندگان:**

Kneipp K., Kneipp H., Itzkan I., Dasari R.R., Feld M.S.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is a spectroscopic technique which combines modern laser spectroscopy with the exciting optical properties of metallic nanostructures, resulting in strongly increased Raman signals when molecules are attached to nanometre-sized gold and silver structures. The effect provides the structural information content of Raman spectroscopy together with ultrasensitive detection limits, allowing Raman spectroscopy of single molecules. Since SERS takes place in the local fields of metallic nanostructures, the lateral resolution of the technique is determined by the confinement of the local fields, which can be two orders of magnitude better than the diffraction limit. Moreover, SERS is an analytical technique, which can give information on surface and interface processes. SERS opens up exciting opportunities in the field of biophysical and biomedical spectroscopy, where it provides ultrasensitive detection and characterization of biophysically/biomedically relevant molecules and processes as well as a vibrational spectroscopy with extremely high spatial resolution. The article briefly introduces the SERS effect and reviews contemporary SERS studies in biophysics/biochemistry and in life sciences. Potential and limitations of the technique are briefly discussed.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1088/0953-8984/14/18/202

✓ **نام ژورنال:**

Journal of Physics Condensed Matter

✓ **سال انتشار:**

2002

✓ **تعداد ارجاعات:**

1133

✓ عنوان پژوهش:

Present and future of surface-enhanced Raman scattering

✓ نویسندگان:

Langer J., de Aberasturi D.J., Aizpurua J., Alvarez-Puebla R.A., Auguié B., Baumberg J.J., Bazan G.C., Bell S.E.J., Boisen A., Brolo A.G., Choo J., Cialla-May D., Deckert V., Fabris L., Faulds K., Javier García de Abajo F., Goodacre R., Graham D., Haes A.J., Haynes C.L., Huck C., Itoh T., Käll M., Kneipp J., Kotov N.A., Kuang H., Le Ru E.C., Lee H.K., Li J.-F., Ling X.Y., Maier S.A., Mayerhöfer T., Moskovits M., Murakoshi K., Nam J.-M., Nie S., Ozaki Y., Pastoriza-Santos I., Perez-Juste J., Popp J., Pucci A., Reich S., Ren B., Schatz G.C., Shegai T., Schlücker S., Tay L.-L., George Thomas K., Tian Z.-Q., van Duyne R.P., Vo-Dinh T., Wang Y., Willets K.A., Xu C., Xu H., Xu Y., Yamamoto Y.S., Zhao B., Liz-Marzán L.M.

✓ خلاصه پژوهش:

The discovery of the enhancement of Raman scattering by molecules adsorbed on nanostructured metal surfaces is a landmark in the history of spectroscopic and analytical techniques. Significant experimental and theoretical effort has been directed toward understanding the surface-enhanced Raman scattering (SERS) effect and demonstrating its potential in various types of ultrasensitive sensing applications in a wide variety of fields. In the 45 years since its discovery, SERS has blossomed into a rich area of research and technology, but additional efforts are still needed before it can be routinely used analytically and in commercial products. In this Review, prominent authors from around the world joined together to summarize the state of the art in understanding and using SERS and to predict what can be expected in the near future in terms of research, applications, and technological development. This Review is dedicated to SERS pioneer and our coauthor, the late Prof. Richard Van Duyne, whom we lost during the preparation of this article. © 2020 American Chemical Society. All rights reserved.

✓ لینک DOI (استفاده برای دانلود مقاله)

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✓ نام ژورنال:

ACS Nano

✓ سال انتشار:

2020

✓ تعداد ارجاعات:

1044

✓ **عنوان پژوهش:**

SERS Tags: Novel optical nanoprobes for bioanalysis

✓ **نویسندگان:**

Wang Y., Yan B., Chen L.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is an ultrasensitive vibrational spectroscopic technique to detect molecules on or near the surface of plasmonic nanostructures, greatly extending the role of standard Raman spectroscopy. Since its discovery in the 1970s, SERS has been applied to many analyses, especially in biochemistry and life sciences. Surface-enhanced Raman scattering (SERS) is an ultrasensitive vibrational spectroscopic technique to detect molecules on or near the surface of plasmonic nanostructures, greatly extending the role of standard Raman spectroscopy. The first explanation is that the molecule-surface interaction induces novel charge-transfer intermediates that have higher Raman scattering cross sections than do those of the analyte that is unadsorbed and on the surface.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/cr300120g

✓ **نام ژورنال:**

Chemical Reviews

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

1010

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced: Raman spectroscopy

✓ **نویسندگان:**

Haynes C.L., McFarland A.D., Van Duyne R.P.

✓ **خلاصه پژوهش:**

The 80-year-old Raman phenomenon is the basis of a modern technique that has implications for nanotechnology, modeling, trace analysis, homeland security, and clinical and field analyses. Richard P. Van Duyne and colleagues at Northwestern University discuss the basics, instrumentation, pluses and minuses, and applications in surface science, bio- and chemosensing, and single-molecule measurements.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/ac053456d

✓ **نام ژورنال:**

Analytical Chemistry

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

951

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Nanostructure-based plasmon-enhanced Raman spectroscopy for surface analysis of materials

✓ **نویسندگان:**

Ding S.-Y., Yi J., Li J.-F., Ren B., Wu D.-Y., Panneerselvam R., Tian Z.-Q.

✓ **خلاصه پژوهش:**

Since 2000, there has been an explosion of activity in the field of plasmon-enhanced Raman spectroscopy (PERS), including surface-enhanced Raman spectroscopy (SERS), tip-enhanced Raman spectroscopy (TERS) and shell-isolated nanoparticle-enhanced Raman spectroscopy (SHINERS). In this Review, we explore the mechanism of PERS and discuss PERS hotspots-nanoscale regions with a strongly enhanced local electromagnetic field-that allow trace-molecule detection, biomolecule analysis and surface characterization of various materials. In particular, we discuss a new generation of hotspots that are generated from hybrid structures combining PERS-active nanostructures and probe materials, which feature a strong local electromagnetic field on the surface of the probe material. Enhancement of surface Raman signals up to five orders of magnitude can be obtained from materials that are weakly SERS active or SERS inactive. We provide a detailed overview of future research directions in the field of PERS, focusing on new PERS-active nanomaterials and nanostructures and the broad application prospect for materials science and technology. © 2016 Macmillan Publishers Limited, part of Springer Nature. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Nature Reviews Materials

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

852

✓ **عنوان پژوهش:**

Surface-Enhanced Raman Spectroscopy for Bioanalysis: Reliability and Challenges

✓ **نویسندگان:**

Zong C., Xu M., Xu L.-J., Wei T., Ma X., Zheng X.-S., Hu R., Ren B.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) inherits the rich chemical fingerprint information on Raman spectroscopy and gains sensitivity by plasmon-enhanced excitation and scattering. In particular, most Raman peaks have a narrow width suitable for multiplex analysis, and the measurements can be conveniently made under ambient and aqueous conditions. These merits make SERS a very promising technique for studying complex biological systems, and SERS has attracted increasing interest in biorelated analysis. However, there are still great challenges that need to be addressed until it can be widely accepted by the biorelated communities, answer interesting biological questions, and solve fatal clinical problems. SERS applications in bioanalysis involve the complex interactions of plasmonic nanomaterials with biological systems and their environments. The reliability becomes the key issue of bioanalytical SERS in order to extract meaningful information from SERS data. This review provides a comprehensive overview of bioanalytical SERS with the main focus on the reliability issue. We first introduce the mechanism of SERS to guide the design of reliable SERS experiments with high detection sensitivity. We then introduce the current understanding of the interaction of nanomaterials with biological systems, mainly living cells, to guide the design of functionalized SERS nanoparticles for target detection. We further introduce the current status of label-free (direct) and labeled (indirect) SERS detections, for systems from biomolecules, to pathogens, to living cells, and we discuss the potential interferences from experimental design, measurement conditions, and data analysis. In the end, we give an outlook of the key challenges in bioanalytical SERS, including reproducibility, sensitivity, and spatial and time resolution. © 2018 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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Chemical Reviews

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

765

✓ **عنوان پژوهش:**

Nanostructured surfaces and assemblies as SERS media

✓ **نویسندگان:**

Ko H., Singamaneni S., Tsukruk V.V.

✓ **خلاصه پژوهش:**

Metallic nanostructures attract much interest as an efficient media for surface-enhanced Raman scattering (SERS). Significant progress has been made on the synthesis of metal nanoparticles with various shapes, composition, and controlled plasmonic properties, all critical for an efficient SERS response. For practical applications, efficient strategies of assembling metal nanoparticles into organized nanostructures are paramount for the fabrication of reproducible, stable, and highly active SERS substrates. Recent progress in the synthesis of novel plasmonic nanoparticles, fabrication of highly ordered one-, two-, and three-dimensional SERS substrates, and some applications of corresponding SERS effects are discussed. © 2008 Wiley-VCH Verlag GmbH & Co. KGaA.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/smll.200800337

✓ **نام ژورنال:**

Small

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

678

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Electromagnetic theories of surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Ding S.-Y., You E.-M., Tian Z.-Q., Moskovits M.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) and related spectroscopies are powered primarily by the concentration of the electromagnetic (EM) fields associated with light in or near appropriately nanostructured electrically-conducting materials, most prominently, but not exclusively high-conductivity metals such as silver and gold. This field concentration takes place on account of the excitation of surface-plasmon (SP) resonances in the nanostructured conductor. Optimizing nanostructures for SERS, therefore, implies optimizing the ability of plasmonic nanostructures to concentrate EM optical fields at locations where molecules of interest reside, and to enhance the radiation efficiency of the oscillating dipoles associated with these molecules and nanostructures. This review summarizes the development of theories over the past four decades pertinent to SERS, especially those contributing to our current understanding of SP-related SERS. Special emphasis is given to the salient strategies and theoretical approaches for optimizing nanostructures with hotspots as efficient EM near-field concentrating and far-field radiating substrates for SERS. A simple model is described in terms of which the upper limit of the SERS enhancement can be estimated. Several experimental strategies that may allow one to approach, or possibly exceed this limit, such as cascading the enhancement of the local and radiated EM field by the multiscale EM coupling of hierarchical structures, and generating hotspots by hybridizing an antenna mode with a plasmonic waveguide cavity mode, which would result in an increased local field enhancement, are discussed. Aiming to significantly broaden the application of SERS to other fields, and especially to material science, we consider hybrid structures of plasmonic nanostructures and other material phases and strategies for producing strong local EM fields at desired locations in such hybrid structures. In this vein, we consider some of the numerical strategies for simulating the optical properties and consequential SERS performance of particle-on-substrate systems that might guide the design of SERS-active systems. Finally, some current theoretical attempts are briefly discussed for unifying EM and non-EM contribution to SERS. © 2017 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

668

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy (SERS): Progress and trends

✓ **نویسندگان:**

Cialla D., März A., Böhme R., Theil F., Weber K., Schmitt M., Popp J.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) combines molecular fingerprint specificity with potential single-molecule sensitivity. Therefore, the SERS technique is an attractive tool for sensing molecules in trace amounts within the field of chemical and biochemical analytics. Since SERS is an ongoing topic, which can be illustrated by the increased annual number of publications within the last few years, this review reflects the progress and trends in SERS research in approximately the last three years. The main reason why the SERS technique has not been established as a routine analytic technique, despite its high specificity and sensitivity, is due to the low reproducibility of the SERS signal. Thus, this review is dominated by the discussion of the various concepts for generating powerful, reproducible, SERS-active surfaces. Furthermore, the limit of sensitivity in SERS is introduced in the context of single-molecule spectroscopy and the calculation of the 'real' enhancement factor. In order to shed more light onto the underlying molecular processes of SERS, the theoretical description of SERS spectra is also a growing research field and will be summarized here. In addition, the recording of SERS spectra is affected by a number of parameters, such as laser power, integration time, and analyte concentration. To benefit from synergies, SERS is combined with other methods, such as scanning probe microscopy and microfluidics, which illustrates the broad applications of this powerful technique. [Figure not available: see fulltext.] © 2011 Springer-Verlag.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s00216-011-5631-x

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

619

✓ **عنوان پژوهش**:

SERS Nanoparticles in Medicine: From Label-Free Detection to Spectroscopic Tagging

✓ **نویسندگان**:

Lane L.A., Qian X., Nie S.

✓ **خلاصه پژوهش**:

[No abstract available]

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1021/acs.chemrev.5b00265

✓ **نام ژورنال**:

Chemical Reviews

✓ **سال انتشار**:

2015

✓ **تعداد ارجاعات**:

578

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Creating, characterizing, and controlling chemistry with SERS hot spots

✓ **نویسندگان:**

Kleinman S.L., Frontiera R.R., Henry A.-I., Dieringer J.A., Van Duyne R.P.

✓ **خلاصه پژوهش:**

In this perspective we discuss the roles of hot spots in surface-enhanced Raman spectroscopy (SERS). After giving background and defining the hot spot, we evaluate a variety of SERS substrates which often contain hot spots. We compare and discuss the differentiating properties of each substrate. We then provide a thorough analysis of the hot spot contribution to the observed SERS signal both in ensemble-averaged and single-molecule conditions. We also enumerate rules for determining the SERS enhancement factor (EF) to clarify the use of this common metric. Finally, we present a forward-looking overview of applications and uses of hot spots for controlling chemistry on the nanoscale. Although not exhaustive, this perspective is a review of some of the most interesting and promising methodologies for creating, controlling, and using hot spots for electromagnetic amplification. © the Owner Societies 2013.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

540

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Single-molecule surface-enhanced raman spectroscopy

✓ **نویسندگان:**

Le Ru E.C., Etchegoin P.G.

✓ **خلاصه پژوهش:**

A general overview of the field of single-molecule (SM) surface-enhanced Raman spectroscopy (SERS) as it stands today is provided. After years of debates on the basic aspects of SM-SERS, the technique is emerging as a well-established subfield of spectroscopy and SERS. SM-SERS is allowing the observation of subtle spectroscopic phenomena that were not hitherto accessible. Examples of the latter are natural isotopic substitutions in single molecules, observation of the true homogeneous broadening of Raman peaks, Raman excitation profiles of individual molecules, and SM electrochemistry. With background examples of the contributions produced by our group, properly interleaved with results by other practitioners in the field, we present some of the latest developments and promising new leads in this new field of spectroscopy. © Copyright ©2012 by Annual Reviews. All rights reserved.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1146/annurev-physchem-032511-143757

✓ **نام ژورنال:**

Annual Review of Physical Chemistry

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

534

Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced raman spectroscopy: Substrate-related issues

✓ **نویسندگان:**

Lin X.-M., Cui Y., Xu Y.-H., Ren B., Tian Z.-Q.

✓ **خلاصه پژوهش:**

After over 30 years of development, surface-enhanced Raman spectroscopy (SERS) is now facing a very important stage in its history. The explosive development of nanoscience and nanotechnology has assisted the rapid development of SERS, especially during the last 5 years. Further development of surface-enhanced Raman spectroscopy is mainly limited by the reproducible preparation of clean and highly surface enhanced Raman scattering (SERS) active substrates. This review deals with some substrate-related issues. Various methods will be introduced for preparing SERS substrates of Ag and Au for analytical purposes, from SERS substrates prepared by electrochemical or vacuum methods, to well-dispersed Au or Ag nanoparticle sols, to nanoparticle thin film substrates, and finally to ordered nanostructured substrates. Emphasis is placed on the analysis of the advantages and weaknesses of different methods in preparing SERS substrates. Closely related to the application of SERS in the analysis of trace sample and unknown systems, the existing cleaning methods for SERS substrates are analyzed and a combined chemical adsorption and electrochemical oxidation method is proposed to eliminate the interference of contaminants. A defocusing method is proposed to deal with the laser-induced sample decomposition problem frequently met in SERS measurement to obtain strong signals. The existing methods to estimate the surface enhancement factor, a criterion to characterize the SERS activity of a substrate, are analyzed and some guidelines are proposed to obtain the correct enhancement factor. © 2009 Springer-Verlag.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

503

✓ **عنوان پژوهش:**

Recent progress in SERS biosensing

✓ **نویسندگان:**

Bantz K.C., Meyer A.F., Wittenberg N.J., Im H., Kurtuluş Ö., Lee S.H., Lindquist N.C., Oh S.-H., Haynes C.L.

✓ **خلاصه پژوهش:**

This perspective gives an overview of recent developments in surface-enhanced Raman scattering (SERS) for biosensing. We focus this review on SERS papers published in the last 10 years and to specific applications of detecting biological analytes. Both intrinsic and extrinsic SERS biosensing schemes have been employed to detect and identify small molecules, nucleic acids, lipids, peptides, and proteins, as well as for in vivo and cellular sensing. Current SERS substrate technologies along with a series of advancements in surface chemistry, sample preparation, intrinsic/extrinsic signal transduction schemes, and tip-enhanced Raman spectroscopy are discussed. The progress covered herein shows great promise for widespread adoption of SERS biosensing. © 2011 the Owner Societies.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1039/c0cp01841d

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

475

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

SERS: A versatile tool in chemical and biochemical diagnostics

✓ **نویسندگان:**

Hering K., Cialla D., Ackermann K., Dörfer T., Möller R., Schneidewind H., Mattheis R., Fritzsche W., Rösch P., Popp J.

✓ **خلاصه پژوهش:**

Raman spectroscopy is a valuable tool in various research fields. The technique yields structural information from all kind of samples often without the need for extensive sample preparation. Since the Raman signals are inherently weak and therefore do not allow one to investigate substances in low concentrations, one possible approach is surface-enhanced (resonance) Raman spectroscopy. Here, rough coin metal surfaces enhance the Raman signal by a factor of 104-1015, depending on the applied method. In this review we discuss recent developments in SERS spectroscopy and their impact on different research fields. © 2007 Springer-Verlag.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

457

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering (SERS) and surface-enhanced resonance raman scattering (SERRS): A review of applications

✓ **نویسندگان:**

McNay G., Eustace D., Smith W.E., Faulds K., Graham D.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) and surface-enhanced resonance Raman scattering (SERRS) can provide positive identification of an analyte or an analyte mixture with high sensitivity and selectivity. Better understanding of the theory and advances in the understanding of the practice have led to the development of practical applications in which the unique advantages of SERS/SERRS have been used to provide effective solutions to difficult analytical problems. This review presents a basic theory and illustrates the way in which SERS/SERRS has been developed for practical use. © 2011 Society for Applied Spectroscopy.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1366/11-06365

✓ **نام ژورنال:**

Applied Spectroscopy

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

444

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

A perspective on single molecule SERS: Current status and future challenges

✓ **نویسندگان:**

Etchegoin P.G., Le Ru E.C.

✓ **خلاصه پژوهش:**

We present an overview of a some of the basic principles underlying current research in single-molecule surface-enhanced Raman scattering (SM-SERS). We summarize, by the same token, a series of conditions and characteristics that are common to most SM-SERS conditions, and discuss their implications for the understanding of data and for the comparison among different methods. We try to emphasize aspects of the problem that are not conventionally discussed in detail in the literature. In particular, we provide a full length discussion on the topics of: (i) the minimum SERS enhancement necessary to observe a single molecule, and (ii) the spatial distribution of the enhancement factor (EF) around hot-spots (which affects the statistics of SM-SERS events). A brief outlook into future perspectives of the different techniques used in SM-SERS and a few outstanding questions are also provided. © the Owner Societies.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/b809196j

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

423

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Graphene: A platform for surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Xu W., Mao N., Zhang J.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) imparts Raman spectroscopy with the capability of detecting analytes at the single-molecule level, but the costs are also manifold, such as a loss of signal reproducibility. Despite remarkable steps having been taken, presently SERS still seems too young to shoulder analytical missions in various practical situations. By the virtue of its unique molecular structure and physical/chemical properties, the rise of graphene opens up a unique platform for SERS studies. In this review, the multi-role of graphene played in SERS is overviewed, including as a Raman probe, as a substrate, as an additive, and as a building block for a flat surface for SERS. Apart from versatile improvements of SERS performance towards applications, graphene-involved SERS studies are also expected to shed light on the fundamental mechanism of the SERS effect. Graphene is a unique platform for surface-enhanced Raman spectroscopy (SERS). The multi-role of graphene played in SERS is overviewed, including as a Raman probe, as a substrate, as an additive, and as a building block of a flat surface for SERS. Apart from versatile improvements on SERS performance towards applications, graphene-involved SERS studies are also expected to shed light on the fundamental mechanism of the SERS effect. Copyright © 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/smll.201203097

✓ **نام ژورنال:**

Small

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

410

✓ **عنوان پژوهش:**

Progress in plasmonic engineering of surface-enhanced Raman-scattering substrates toward ultra-trace analysis

✓ **نویسندگان:**

Baker G.A., Moore D.S.

✓ **خلاصه پژوهش:**

This review describes advances made toward the application of surface-enhanced Raman scattering (SERS) in sensitive analysis and diagnostics. In the early sections of this review we briefly introduce the fundamentals of SERS including a discussion of SERS at the single-molecule level. Applications relevant to trace analysis, environmental monitoring, and homeland security and defense, for example high explosives and contaminant detection, are emphasized. Because the key to wider application of SERS analysis lies in the development of highly enhancing substrates, in the second half of the review we focus our attention on the extensive progress made in designing innovative soluble, supported, and ordered SERS-active nano-architectures to harness the potential of this technique toward solving current and emerging analytical tasks. No attempt or claim is made to review the field exhaustively in its entirety nor to cover all applications, but only to describe several significant milestones and progress made in these important areas and to provide some perspective on where the field is quickly moving. © Springer-Verlag 2005.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1007/s00216-005-3353-7

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

396

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Single-Molecule Chemistry with Surface- and Tip-Enhanced Raman Spectroscopy

✓ **نویسندگان:**

Zrimsek A.B., Chiang N., Mattei M., Zaleski S., McAnally M.O., Chapman C.T., Henry A.-I., Schatz G.C., Van Duyne R.P.

✓ **خلاصه پژوهش:**

Single-molecule (SM) surface-enhanced Raman spectroscopy (SERS) and tip-enhanced Raman spectroscopy (TERS) have emerged as analytical techniques for characterizing molecular systems in nanoscale environments. SERS and TERS use plasmonically enhanced Raman scattering to characterize the chemical information on single molecules. Additionally, TERS can image single molecules with subnanometer spatial resolution. In this review, we cover the development and history of SERS and TERS, including the concept of SERS hot spots and the plasmonic nanostructures necessary for SM detection, the past and current methodologies for verifying SMSERS, and investigations into understanding the signal heterogeneities observed with SMSERS. Moving on to TERS, we cover tip fabrication and the physical origins of the subnanometer spatial resolution. Then, we highlight recent advances of SMSERS and TERS in fields such as electrochemistry, catalysis, and SM electronics, which all benefit from the vibrational characterization of single molecules. SMSERS and TERS provide new insights on molecular behavior that would otherwise be obscured in an ensemble-averaged measurement. © 2016 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.chemrev.6b00552

✓ **نام ژورنال:**

Chemical Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

384

✓ عنوان پژوهش:

Expanding generality of surface-enhanced Raman spectroscopy with borrowing SERS activity strategy

✓ نویسندگان:

Tian Z.-Q., Ren B., Li J.-F., Yang Z.-L.

✓ خلاصه پژوهش:

Surface-enhanced Raman scattering (SERS) was discovered three decades ago and has gone through a tortuous pathway to develop into a powerful diagnostic technique. Recently, the lack of substrate, surface and molecular generalities of SERS has been circumvented to a large extent by devising and utilizing various nanostructures by many groups including ours. This article aims to present our recent approaches of utilizing the borrowing SERS activity strategy mainly through constructing two types of nanostructures. The first nanostructure is chemically synthesized Au nanoparticles coated with ultra-thin shells (ca. one to ten atomic layers) of various transition metals, e.g., Pt, Pd, Ni and Co, respectively. Boosted by the long-range effect of the enhanced electromagnetic (EM) field generated by the highly SERS-active Au core, the originally low surface enhancement of the transition metal can be substantially improved giving total enhancement factors up to 104-105. It allows us to obtain the Raman spectra of surface water, having small Raman cross-section, on several transition metals for the first time. To expand the surface generality of SERS, tip-enhanced Raman spectroscopy (TERS) has been employed. With TERS, a nanogap can be formed controllably between an atomically flat metal surface and the tip with an optimized shape, within which the enhanced EM field from the tip can be coupled (borrowed) effectively. Therefore, one can obtain surface Raman signals (TERS signals) from adsorbed species at Au(110), Au(111) and, more importantly, Pt(110) surfaces. The enhancement factor achieved on these single crystal surfaces can be up to 106, especially with a very high spatial resolution down to about 14 nm. To fully accomplish the borrowing strategy from different nanostructures and to explain the experimental observations, a three-dimensional finite-difference time-domain method was used to calculate and evaluate the local EM field on the core-shell nanoparticle surfaces and the TERS tips. Finally, prospects and further developments of this valuable strategy are briefly discussed with emphasis on the emerging experimental methodologies. © The Royal Society of Chemistry.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1039/b616986d

✓ نام ژورنال:

Chemical Communications

✓ سال انتشار:

2007

✓ تعداد ارجاعات:

368

✓ **عنوان پژوهش:**

Novel nanostructures for SERS biosensing

✓ **نویسندگان:**

Tripp R.A., Dluhy R.A., Zhao Y.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is a powerful analytical tool for chemical and biological sensing applications. However, one feature which has limited its use in biosensing applications is the difficulty involved in producing uniform, highly sensitive, and reproducible SERS substrates. Recent developments in oblique angle deposition and other nanofabrication techniques have overcome this limitation, providing an unprecedented opportunity to develop SERS substrates for pathogen biosensor applications. Recently reported examples of SERS's newfound sensing abilities include the capacity to detect low levels of viruses and bacteria, as well as to discriminate between types and strains of pathogens, including pathogens with gene deletions. A brief review of our recent progress in SERS biosensing is given in this article. © 2008 Elsevier Ltd. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/S1748-0132(08)70042-2

✓ **نام ژورنال:**

Nano Today

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

366

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Recent progress in surface-enhanced Raman spectroscopy for biological and biomedical applications: From cells to clinics

✓ **نویسندگان:**

Cialla-May D., Zheng X.-S., Weber K., Popp J.

✓ **خلاصه پژوهش:**

The application of surface-enhanced Raman spectroscopy (SERS) in biological and biomedical detection schemes is feasible due to its excellent molecular specificity and high sensitivity as well as the capability of SERS to be performed in complex biological compositions. SERS-based investigation of cells, which are the basic structure and functional unit of organisms, represents the starting point of this review. It is demonstrated that SERS provides a deep understanding of living cells as well as their microenvironment which is needed to assess the development of diseases. The clinical relevance of SERS is proved by its application for the detection of cancer cells and tumour margins under in vivo conditions and examples for theranostic approaches are discussed. This review article provides a comprehensive overview of the recent progress within the last 3 years. © 2017 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c7cs00172j

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

345

TEKSAN Detect Precisely

✓ **عنوان پژوهش**:

Surface-enhanced Raman spectroscopy (SERS) for environmental analyses

✓ **نویسندگان**:

Halvorson R.A., Vikesland P.J.

✓ **خلاصه پژوهش**:

[No abstract available]

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1021/es101228z

✓ **نام ژورنال**:

Environmental Science and Technology

✓ **سال انتشار**:

2010

✓ **تعداد ارجاعات**:

335

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Review of SERS substrates for chemical sensing

✓ **نویسندگان:**

Mosier-Boss P.A.

✓ **خلاصه پژوهش:**

The SERS effect was initially discovered in the 1970s. Early research focused on understanding the phenomenon and increasing enhancement to achieve single molecule detection. From the mid-1980s to early 1990s, research started to move away from obtaining a fundamental understanding of the phenomenon to the exploration of analytical applications. At the same time, significant developments occurred in the field of photonics that led to the advent of inexpensive, robust, compact, field-deployable Raman systems. The 1990s also saw rapid development in nanoscience. This convergence of technologies (photonics and nanoscience) has led to accelerated development of SERS substrates to detect a wide range of chemical and biological analytes. It would be a monumental task to discuss all the different kinds of SERS substrates that have been explored. Likewise, it would be impossible to discuss the use of SERS for both chemical and biological detection. Instead, a review of the most common metallic (Ag, Cu, and Au) SERS substrates for chemical detection only is discussed, as well as SERS substrates that are commercially available. Other issues with SERS for chemical detection have been selectivity, reversibility, and reusability of the substrates. How these issues have been addressed is also discussed in this review. © 2017 by the authors. Licensee MDPI, Basel, Switzerland.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.3390/nano7060142

✓ **نام ژورنال:**

Nanomaterials

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

332

✓ **عنوان پژوهش:**

SERS-Activated Platforms for Immunoassay: Probes, Encoding Methods, and Applications

✓ **نویسندگان:**

Wang Z., Zong S., Wu L., Zhu D., Cui Y.

✓ **خلاصه پژوهش:**

Owing to their excellent multiplexing ability, high sensitivity, and large dynamic range, immunoassays using surface-enhanced Raman scattering (SERS) as the readout signal have found prosperous applications in fields such as disease diagnosis, environmental surveillance, and food safety supervision. Various ever-increasing demands have promoted SERS-based immunoassays from the classical sandwich-type ones to those integrated with fascinating automatic platforms (e.g., test strips and microfluidic chips). As recent years have witnessed impressive progress in SERS immunoassays, we try to comprehensively cover SERS-based immunoassays from their basic working principles to specific applications. Focusing on several basic elements in SERS immunoassays, typical structures of SERS nanoprobes, productive optical spectral encoding strategies, and popular immunoassay platforms are highlighted, followed by their representative biological applications in the last 5 years. Moreover, despite the vast advances achieved to date, SERS immunoassays still suffer from some annoying shortcomings. Thus, proposals on how to improve the SERS immunoassay performance are also discussed, as well as future challenges and perspectives, aiming to give brief and valid guidelines for choosing suitable platforms according to particular applications. © 2017 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.chemrev.7b00027

✓ **نام ژورنال:**

Chemical Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

331

✓ **عنوان پژوهش:**

The eukaryotic-like Ser/Thr protein kinases of Mycobacterium tuberculosis

✓ **نویسندگان:**

Av-Gay Y., Everett M.

✓ **خلاصه پژوهش:**

In bacteria, extracellular signals are generally transduced into cellular responses via a two-component system. However, genome sequence data have now revealed the presence of 'eukaryotic-like' protein kinases and phosphatases. Mycobacterium tuberculosis appears to be unique among bacteria in that its genome contains 11 members of a newly identified protein kinase family. These M. tuberculosis eukaryotic-like protein kinases could be key regulators of metabolic processes, including transcription, cell development and interactions with host cells.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/S0966-842X(00)01734-0

✓ **نام ژورنال:**

Trends in Microbiology

✓ **سال انتشار:**

2000

✓ **تعداد ارجاعات:**

322

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Anisotropic metal nanoparticles for surface enhanced Raman scattering

✓ **نویسندگان:**

Reguera J., Langer J., Jiménez De Aberasturi D., Liz-Marzán L.M.

✓ **خلاصه پژوهش:**

The optimization of the enhancement of Raman scattering by plasmonic effects is largely determined by the properties of the enhancing substrates. The main parameters behind this effect are related to the morphology of plasmonic nanoparticles and their relative distribution within the substrate. We focus this tutorial review on the effects of nanoparticle morphology, for the particular case of anisotropic metal nanoparticles. Anisotropy in silver and gold nanoparticles offers the possibility to tailor their plasmonic properties and intrinsic electromagnetic "hotspots". We describe the effect of varying particle size and shape on the SERS signal, focusing on the most common anisotropic morphologies used for SERS. Especial emphasis is made on existing comparative studies that shed light on the effect of nanoparticle anisotropy on their enhancement capabilities. We aim at providing a general perspective toward understanding the general key factors and highlighting the difficulty in quantitatively determining SERS performance. © 2017 The Royal Society of Chemistry.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1039/c7cs00158d

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

314

✓ **عنوان پژوهش:**

Adsorption and reaction at electrochemical interfaces as probed by surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Tian Z.-Q., Ren B.

✓ **خلاصه پژوهش:**

Over the past three decades, surface-enhanced Raman spectroscopy (SERS) has gone through a tortuous pathway to develop into a powerful surface diagnostic technique for in situ investigation of surface adsorption and reactions on electrodes. This review presents the recent progress achieved mainly in our laboratory on the improvement of detection sensitivities as well as spectral, temporal, and spatial resolutions. Various surface roughening procedures for electrodes of different metals coupled with maximum use of a high-sensitivity confocal Raman microscope enable us to obtain good-quality SER spectra on the electrode surfaces made from net Pt, Ni, Co, Fe, Pd, Rh, Ru, and their alloys that were traditionally considered to be non-SERS active. A novel technique called potential-averaged SERS (PASERS) has been developed for the quantitative study of electrochemical sorption. Applications are exemplified on extensively studied areas such as coadsorption, electrocatalysis, corrosion, and fuel cells, and several advantages of in situ electrochemical SERS are demonstrated. Finally, further developments in this field are briefly discussed with emphasis on the emerging methodology.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1146/annurev.physchem.54.011002.103833

✓ **نام ژورنال:**

Annual Review of Physical Chemistry

✓ **سال انتشار:**

2004

✓ **تعداد ارجاعات:**

313

✓ **عنوان پژوهش:**

A review on surface-enhanced Raman scattering

✓ **نویسندگان:**

Pilot R., Signorini R., Durante C., Orian L., Bhamidipati M., Fabris L.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has become a powerful tool in chemical, material and life sciences, owing to its intrinsic features (i.e., fingerprint recognition capabilities and high sensitivity) and to the technological advancements that have lowered the cost of the instruments and improved their sensitivity and user-friendliness. We provide an overview of the most significant aspects of SERS. First, the phenomena at the basis of the SERS amplification are described. Then, the measurement of the enhancement and the key factors that determine it (the materials, the hot spots, and the analyte-surface distance) are discussed. A section is dedicated to the analysis of the relevant factors for the choice of the excitation wavelength in a SERS experiment. Several types of substrates and fabrication methods are illustrated, along with some examples of the coupling of SERS with separation and capturing techniques. Finally, a representative selection of applications in the biomedical field, with direct and indirect protocols, is provided. We intentionally avoided using a highly technical language and, whenever possible, intuitive explanations of the involved phenomena are provided, in order to make this review suitable to scientists with different degrees of specialization in this field. © 2019 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.3390/bios9020057

✓ **نام ژورنال:**

Biosensors

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

305

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering for protein detection

✓ **نویسندگان:**

Han X.X., Zhao B., Ozaki Y.

✓ **خلاصه پژوهش:**

Proteins are essential components of organisms and they participate in every process within cells. The key characteristic of proteins that allows their diverse functions is their ability to bind other molecules specifically and tightly. With the development of proteomics, exploring high-efficiency detection methods for large-scale proteins is increasingly important. In recent years, rapid development of surface-enhanced Raman scattering (SERS)-based biosensors leads to the SERS realm of applications from chemical analysis to nanostructure characterization and biomedical applications. For proteins, early studies focused on investigating SERS spectra of individual proteins, and the successful design of nanoparticle probes has promoted great progress of SERS-based immunoassays. In this review we outline the development of SERS-based methods for proteins with particular focus on our proposed protein-mediated SERS-active substrates and their applications in label-free and Raman dye-labeled protein detection. © 2009 Springer-Verlag.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1007/s00216-009-2702-3

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

304

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering in cancer detection and imaging

✓ **نویسندگان:**

Vendrell M., Maiti K.K., Dhaliwal K., Chang Y.-T.

✓ **خلاصه پژوهش:**

Technologies that use surface-enhanced Raman scattering (SERS) have experienced significant growth in biomedical research during the past 4 years. In this review we summarize the progress in SERS for cancer diagnostics, including multiplexed detection and identification of new biomarkers, single-nucleotide polymorphisms, and circulating tumor cells. SERS is also used as a non-invasive tool for cancer imaging with immunoSERS microscopy, histological analysis of biopsies, and in vivo detection of tumors. We discuss the future of SERS probes compatible with multiple imaging modalities and their potential for clinical translation (e.g., endoscope-based and intraoperative imaging as tools for surgical guidance). Moreover, we highlight the potential of SERS agents for targeted drug delivery and photothermal therapy. © 2013.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.tibtech.2013.01.013

✓ **نام ژورنال:**

Trends in Biotechnology

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

295

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

SERS microscopy: Nanoparticle probes and biomedical applications

✓ **نویسندگان:**

Schlücker S.

✓ **خلاصه پژوهش:**

Surface-enhaned Raman scattering (SERS) microscopy is a novel method of vibrational microspectroscopic imaging for the selective detection of biomolecules in targeted research. This technique combines the advantages of biofunctionalized metal nanoparticles and Raman microspectroscopy for visualizing and quantifying the distribution of target molecules such as proteins in cells and tissues. Advantages of SERS over existing labeling approaches include the tremendous multiplexing capacity, quantification using the characteristic SERS signatures and high photostability. This review summarizes current designs of nanoparticle-based SERS probes and highlights first biomedical applications of SERS microscopy for protein localization ex and in vivo. © 2009 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/cphc.200900119

✓ **نام ژورنال:**

ChemPhysChem

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

294

TEKSAN
Detect Precisely

✓ عنوان پژوهش:

Signalling specificity of Ser/Thr protein kinases through docking-site-mediated interactions

✓ نویسندگان:

Biondi R.M., Nebreda A.R.

✓ خلاصه پژوهش:

Signal transduction pathways use protein kinases for the modification of protein function by phosphorylation. A major question in the field is how protein kinases achieve the specificity required to regulate multiple cellular functions. Here we review recent studies that illuminate the mechanisms used by three families of Ser/Thr protein kinases to achieve substrate specificity. These kinases rely on direct docking interactions with substrates, using sites distinct from the phosphoacceptor sequences. Docking interactions also contribute to the specificity and regulation of protein kinase activities. Mitogen-activated protein kinase (MAPK) family members can associate with and phosphorylate specific substrates by virtue of minor variations in their docking sequences. Interestingly, the same MAPK docking pocket that binds substrates also binds docking sequences of positive and negative MAPK regulators. In the case of glycogen synthase kinase 3 (GSK3), the presence of a phosphate-binding site allows docking of previously phosphorylated (primed) substrates; this docking site is also required for the mechanism of GSK3 inhibition by phosphorylation. In contrast, non-primed substrates interact with a different region of GSK3. Phosphoinositide-dependent protein kinase-1 (PDK1) contains a hydrophobic pocket that interacts with a hydrophobic motif present in all known substrates, enabling their efficient phosphorylation. Binding of the substrate hydrophobic motifs to the pocket in the kinase domain activates PDK1 and other members of the AGC family of protein kinases. Finally, the analysis of protein kinase structures indicates that the sites used for docking substrates can also bind N- and C-terminal extensions to the kinase catalytic core and participate in the regulation of its activity.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1042/BJ20021641

✓ نام ژورنال:

Biochemical Journal

✓ سال انتشار:

2003

✓ تعداد ارجاعات:

273

✓ عنوان پژوهش:

Designing surface-enhanced Raman scattering (SERS) platforms beyond hotspot engineering: Emerging opportunities in analyte manipulations and hybrid materials

✓ نویسندگان:

Lee H.K., Lee Y.H., Koh C.S.L., Phan-Quang G.C., Han X., Lay C.L., Sim H.Y.F., Kao Y.-C., An Q., Ling X.Y.

✓ خلاصه پژوهش:

Surface-enhanced Raman scattering (SERS) is a molecule-specific spectroscopic technique with diverse applications in (bio)chemistry, clinical diagnosis and toxin sensing. While hotspot engineering has expedited SERS development, it is still challenging to detect molecules with no specific affinity to plasmonic surfaces. With the aim of improving detection performances, we venture beyond hotspot engineering in this tutorial review and focus on emerging material design strategies to capture and confine analytes near SERS-active surfaces as well as various promising hybrid SERS platforms. We outline five major approaches to enhance SERS performance: (1) enlarging Raman scattering cross-sections of non-resonant molecules via chemical coupling reactions; (2) targeted chemical capturing of analytes through surface-grafted agents to localize them on plasmonic surfaces; (3) physically confining liquid analytes on non-wetting SERS-active surfaces and (4) confining gaseous analytes using porous materials over SERS hotspots; (5) synergizing conventional metal-based SERS platforms with functional materials such as graphene, semiconducting materials, and piezoelectric polymers. These approaches can be integrated with engineered hotspots as a multifaceted strategy to further boost SERS sensitivities that are unachievable using hotspot engineering alone. Finally, we highlight current challenges in this research area and suggest new research directions towards efficient SERS designs critical for real-world applications. © 2019 The Royal Society of Chemistry.

✓ لینک DOI (استفاده برای دانلود مقاله)

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✓ نام ژورنال:

Chemical Society Reviews

✓ سال انتشار:

2019

✓ تعداد ارجاعات:

259

✓ **عنوان پژوهش:**

Review of surface enhanced Raman spectroscopic (SERS) detection of synthetic chemical pesticides

✓ **نویسندگان:**

Pang S., Yang T., He L.

✓ **خلاصه پژوهش:**

Pesticides are essential in modern agricultural practices. Detection of pesticides is an essential step in regulating and monitoring the levels of pesticides in the environment. Even though GC/LC-MS is often the gold standard method for pesticide detection, recent technological advancements has promoted the creation of alternative techniques, such as Surface Enhanced Raman Spectroscopy (SERS), that provide added advantages such as ultrasensitive detection, faster turnover, simpler protocols, in situ sampling, on-site capability and reduced cost. In this review, a comprehensive report of recent advances in SERS detection of synthetic chemical pesticides is given. The development and applications of the SERS technique for pesticide detection in both simple and complex matrices are discussed. The main advantages of using SERS for pesticide detection are highlighted, together with its limitations. Lastly, promising future trends and applications of SERS for pesticides detection are also discussed. © 2016 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.trac.2016.06.017

✓ **نام ژورنال:**

TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

259

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering on colloidal nanostructures

✓ **نویسندگان:**

Aroca R.F., Alvarez-Puebla R.A., Pieczonka N., Sanchez-Cortez S., Garcia-Ramos J.V.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering combines extremely high sensitivity, due to enhanced Raman cross-sections comparable or even better than fluorescence, with the observation of vibrational spectra of adsorbed species, providing one of the most incisive analytical methods for chemical and biochemical detection and analysis. SERS spectra are observed from a molecule-nanostructure enhancing system. This symbiosis molecule-nanostructure is a fertile ground for theoretical developments and a realm of applications from single molecule detection to biomedical diagnostic and techniques for nanostructure characterization. © 2005 Elsevier B.V. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.cis.2005.04.007

✓ **نام ژورنال:**

Advances in Colloid and Interface Science

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

248

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Expanding applications of SERS through versatile nanomaterials engineering

✓ **نویسندگان:**

Cardinal M.F., Vander Ende E., Hackler R.A., McAnally M.O., Stair P.C., Schatz G.C., Van Duyne R.P.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) spectroscopy has evolved into a cross-disciplinary analytical technique by unveiling relevant chemical, biological, material, and structural information. The focus of this review is on two critical properties for successfully expanding applications of SERS spectroscopy: quality of the plasmonic substrate and molecule localization to the substrate. In this review, we discuss recent work on quantifying SERS distance dependence, key factors for substrate characterization and performance evaluation, expansion of SERS applications through substrate development for UV plasmonics and short-distance capture strategies for optimizing analyte-surface structures. After surveying the recent developments of these seemingly disparate fields, we suggest new research directions that may originate from a synergistic blend of all the herein discussed topics. Finally, we discuss major challenges and open questions related to the application of SERS for understanding of chemical processes at the nanoscale, with special interest on in situ catalysts and biosensing. © 2017 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c7cs00207f

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

233

✓ **عنوان پژوهش:**

Ser/Thr phosphorylation of IRS proteins: a molecular basis for insulin resistance.

✓ **نویسندگان:**

Zick Y.

✓ **خلاصه پژوهش:**

S6K1, like other serine and threonine kinases activated by insulin (such as mTOR and PKCzeta), has recently been shown to participate in negative feedback mechanisms aimed at terminating insulin signaling through IRS (insulin receptor substrate) phosphorylation. Such homeostatic mechanisms can also be activated by excess nutrients or inducers of insulin resistance (such as fatty acids and proinflammatory cytokines) to produce an insulin-resistant state that often leads to the development of diabetes. Identification of the specific kinases involved in such insulin resistance pathways can help lead to the rational design of novel therapeutic agents for treating insulin resistance and type 2 diabetes.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1126/stke.2682005pe4

✓ **نام ژورنال:**

Science's STKE : signal transduction knowledge environment

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

231

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy for in vivo biosensing

✓ **نویسندگان:**

Laing S., Jamieson L.E., Faulds K., Graham D.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is of interest for biomedical analysis and imaging because of its sensitivity, specificity and multiplexing capabilities. The successful application of SERS for in vivo biosensing requires probes to be biocompatible and procedures to be minimally invasive, challenges that have respectively been met by developing new nanoprobes and instrumentation. This Review presents recent developments in these areas, describing case studies in which sensors have been implemented, as well as outlining shortcomings that must be addressed before SERS sees clinical use. © 2017 Macmillan Publishers Limited.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1038/s41570-017-0060

✓ **نام ژورنال:**

Nature Reviews Chemistry

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

222

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopic study of p-aminothiophenol

✓ **نویسندگان:**

Huang Y.-F., Wu D.-Y., Zhu H.-P., Zhao L.-B., Liu G.-K., Ren B., Tian Z.-Q.

✓ **خلاصه پژوهش:**

p-aminothiophenol (PATP) is an important molecule for surface-enhanced Raman spectroscopy (SERS). It can strongly interact with metallic SERS substrates and produce very strong SERS signals. It is a molecule that has often been used for mechanistic studies of the SERS mechanism as the photon-driven charge transfer (CT) mechanism is believed to be present for this molecule. Recently, a hot debate over the SERS behavior of PATP was triggered by our finding that PATP can be oxidatively transformed into 4,4′- dimercaptoazobenzene (DMAB), which gives a SERS spectra of so-called "b 2 modes". In this perspective, we will give a general overview of the SERS mechanism and the current status of SERS studies on PATP. We will then demonstrate with our experimental and theoretical evidence that it is DMAB which contributes to the characteristic SERS behavior in the SERS spectra of PATP and analyze some important experimental phenomena in the framework of the surface reaction instead of the contribution "b 2 modes". We will then point out the existing challenges of the present system. A clear understanding of the reaction mechanism for nitrobenzene or aromatic benzene will be important to not only understand the SERS mechanism but to also provide an economic way of producing azo dyes with a very high selectivity and conversion rate. This journal is © the Owner Societies 2012.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c2cp40558j

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

221

✓ **عنوان پژوهش:**

Multiplex in vitro detection using SERS

✓ **نویسندگان:**

Laing S., Gracie K., Faulds K.

✓ **خلاصه پژوهش:**

The ability to detect multiple disease-related targets from a single biological sample in a quick and reliable manner is of high importance in diagnosing and monitoring disease. The technique known as surface enhanced Raman scattering (SERS) has been developed for the simultaneous detection of multiple targets present in biological samples. Advances in the SERS method have allowed for the sensitive and specific detection of biologically relevant targets, such as DNA and proteins, which could be useful vor the detection and control of0disease. This review focuses on0the strengths of SERS for the dutection of target molecules fro} complex mixtures and the clinical relevance of recent work combining SERS with multiplexed detection of biological targets. © The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c5cs00644a

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

219

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Recent approaches toward creation of hot spots for SERS detection

✓ **نویسندگان:**

Shiohara A., Wang Y., Liz-Marzán L.M.

✓ **خلاصه پژوهش:**

Surface enhanced Raman scattering (SERS) spectroscopy is a powerful technique that provides molecular information through greatly enhanced Raman scattering from minute amounts of substance near nanostructured metallic surfaces. SERS is thus a promising technique for ultrasensitive sensing applications. Plasmonic nanostructures including metal nanoparticles and lithographically prepared nanostructures are ideal substrates to produce enhanced Raman signals. Numerous studies have been published on the production of SERS-active substrates for SERS measurements including solution phase methods and solid supports. In SERS applications, hot spots where the electromagnetic field is particularly intense, play a key role. In this review, we provide an overview of techniques designed for the creation of SERS hot spots both in solution and on solid supports. We first introduce the self-assembly of spherical and anisotropic nanoparticles in solution, to then focus on a wide variety of techniques to assemble nanoparticles onto solid supports. We also describe top-down approaches typically based on lithography techniques. Finally, we provide our own view on the current state of the field and the aspects where further development is expected. © 2014 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.jphotochemrev.2014.09.001

✓ **نام ژورنال:**

Journal of Photochemistry and Photobiology C: Photochemistry Reviews

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

214

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Explosive and chemical threat detection by surface-enhanced Raman scattering: A review

✓ **نویسندگان:**

Hakonen A., Andersson P.O., Stenbæk Schmidt M., Rindzevicius T., Käll M.

✓ **خلاصه پژوهش:**

Acts of terror and warfare threats are challenging tasks for defense agencies around the world and of growing importance to security conscious policy makers and the general public. Explosives and chemical warfare agents are two of the major concerns in this context, as illustrated by the recent Boston Marathon bombing and nerve gas attacks on civilians in the Middle East. To prevent such tragic disasters, security personnel must be able to find, identify and deactivate the threats at multiple locations and levels. This involves major technical and practical challenges, such as detection of ultra-low quantities of hazardous compounds at remote locations for anti-terror purposes and monitoring of environmental sanitation of dumped or left behind toxic substances and explosives. Surface-enhanced Raman scattering (SERS) is one of todays most interesting and rapidly developing methods for label-free ultrasensitive vibrational "fingerprinting" of a variety of molecular compounds. Performance highlights include attomolar detection of TNT and DNT explosives, a sensitivity that few, if any, other technique can compete with. Moreover, instrumentation needed for SERS analysis are becoming progressively better, smaller and cheaper, and can today be acquired for a retail price close to 10,000 US$. This contribution aims to give a comprehensive overview of SERS as a technique for detection of explosives and chemical threats. We discuss the prospects of SERS becoming a major tool for convenient in-situ threat identification and we summarize existing SERS detection methods and substrates with particular focus on ultra-sensitive real-time detection. General concepts, detection capabilities and perspectives are discussed in order to guide potential users of the technique for homeland security and anti-warfare purposes. © 2015 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.aca.2015.04.010

✓ **نام ژورنال:**

Analytica Chimica Acta

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

213

✓ **عنوان پژوهش:**

Recent progress in surface enhanced Raman spectroscopy for the detection of environmental pollutants

✓ **نویسندگان:**

Li D.-W., Zhai W.-L., Li Y.-T., Long Y.-T.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) has emerged as one of the most promising analytical tools in recent years. Due to advantageous features such as sensitivity, specificity, ease of operation and rapidity, SERS is particularly well suited for environmental analysis. We summarize here some considerations with respect to the detection of pollutants by SERS and provide an overview on recent achievements in the determination of organic pollutants, heavy metal ions, and pathogens. Following an introduction into the topic and considering aspects of sensitivity, selectivity, reproducibility and portability, we are summarizing applications of SERS in the detection of pollutants, with sections on organic pollutants (pesticides, PAHs and PCBs, explosives), on heavy metal ions, and on pathogens. In addition, we discuss current challenges and give an outlook on applications of SERS in environmental analysis. Contains 174 references. [Figure not available: see fulltext.] © 2013 Springer-Verlag Wien.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1007/s00604-013-1115-3

✓ **نام ژورنال:**

Microchimica Acta

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

210

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Prospects for plasmonic hot spots in single molecule SERS towards the chemical imaging of live cells

✓ **نویسندگان:**

Radziuk D., Moehwald H.

✓ **خلاصه پژوهش:**

Single molecule surface enhanced Raman scattering (SM-SERS) is a highly local effect occurring at sharp edges, interparticle junctions and crevices or other geometries with a sharp nanoroughness of plasmonic nanostructures ("hot spots"). The emission of an individual molecule at SM-SERS conditions depends on the local enhancement field of the hot spots, as well as the binding affinity and positioning at a hot spot region. In this regard, the stability of near-field nano-optics at hot spots is critical, particularly in a biological milieu. In this perspective review, we address recent advances in the experimental and theoretical approaches for the successful development of SM-SERS. Significant progress in the understanding of the interaction between the excitation electromagnetic field and the surface plasmon modes at the metallic or metallic/dielectric interface of various curvatures are described. New knowledge on methodological strategies for positioning the analytes for SM-SERS and Raman-assisted SERS or the SERS imaging of live cells has been acquired and displayed. In the framework of the extensive development of SM-SERS as an advancing diagnostic analytical technique, the real-time SERS chemical imaging of intracellular compartments and tracing of individual analytes has been achieved. In this context, we highlight the tremendous potential of SERS chemical imaging as a future prospect in SERS and SM-SERS for the prediction and diagnosis of diseases. © the Owner Societies 2015.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c4cp04946b

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

209

✓ **عنوان پژوهش:**

SERS detection of small inorganic molecules and ions

✓ **نویسندگان:**

Alvarez-Puebla R.A., Liz-Marzán L.M.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is one of the most straightforward applications of the so-called nanoplasmonics. This powerful molecular spectroscopy technique is based on the enhancement of the inelastic scattering from molecules located near nanostructured metallic surfaces when these are illuminated and surface plasmons are excited. The analytical applications of SERS are hindered when the Raman cross-section of the analyte is too low, which is often the case in inorganic molecular species. This problem is even more serious when atomic species are to be identified, since these cannot display a vibrational signal. Herein we discuss the recent advancements toward the SERS detection of small inorganic compounds, including both molecular and atomic species. SERS you right: Surface-enhanced Raman scattering (SERS) can be used for the direct or indirect detection of inorganic molecules and even ions, in spite of their intrinsically low Raman scattering cross-sections. Recent advances even allow ion sensing and localization within living organisms (see picture). Copyright © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1002/anie.201204438

✓ **نام ژورنال:**

Angewandte Chemie - International Edition

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

207

✓ **عنوان پژوهش:**

Nanostructures and nanostructured substrates for surface-enhanced Raman scattering (SERS)

✓ **نویسندگان:**

Brown R.J.C., Milton M.J.T.

✓ **خلاصه پژوهش:**

We review the performance of various nanoscaled structures needed to support the propagation of the surface plasmons responsible for surface-enhanced Raman scattering (SERS), and assess the potential for the optimisation of the compromise between enhancement and reproducibility that they provide, and hence their utility for relevant applications. We divide these nanostructures into those comprising structured arrays of discrete nanoparticles in two or three dimensions, and those comprising structured or regularly patterned surfaces in two or three dimensions. The most promising in terms of this compromise are those that involve the tethering of functionalised metal nanoparticles to surfaces. They are not only reproducible, but the functionalisation provides a measure of selectivity to relevant target analytes that the majority of SERS applications require. Copyright © 2008 John Wiley & Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/jrs.2030

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

206

TEKSAN Detect Precisely

✓ **عنوان پژوهش**:

Review of Surface Enhanced Raman Scattering Applications in Forensic Science

✓ **نویسندگان**:

Muehlethaler C., Leona M., Lombardi J.R.

✓ **خلاصه پژوهش**:

[No abstract available]

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1021/acs.analchem.5b04131

✓ **نام ژورنال**:

Analytical Chemistry

✓ **سال انتشار**:

2016

✓ **تعداد ارجاعات**:

205

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Unconventional serine proteases: Variations on the catalytic Ser/His/Asp triad configuration

✓ **نویسندگان:**

Ekici Ö.D., Paetzel M., Dalbey R.E.

✓ **خلاصه پژوهش:**

Serine proteases comprise nearly one-third of all known proteases identified to date and play crucial roles in a wide variety of cellular as well as extracellular functions, including the process of blood clotting, protein digestion, cell signaling, inflammation, and protein processing. Their hallmark is that they contain the so-called "classical" catalytic Ser/His/Asp triad. Although the classical serine proteases are the most widespread in nature, there exist a variety of "nonclassical" serine proteases where variations to the catalytic triad are observed. Such variations include the triads Ser/His/Glu, Ser/His/His, and Ser/Glu/Asp, and include the dyads Ser/Lys and Ser/His. Other variations are seen with certain serine and threonine peptidases of the Ntn hydrolase superfamily that carry out catalysis with a single active site residue. This work discusses the structure and function of these novel serine proteases and threonine proteases and how their catalytic machinery differs from the prototypic serine protease class. Copyright © 2008 The Protein Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1110/ps.035436.108

✓ **نام ژورنال:**

Protein Science

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

205

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Label and label-free based surface-enhanced Raman scattering for pathogen bacteria detection: A review

✓ **نویسندگان:**

Liu Y., Zhou H., Hu Z., Yu G., Yang D., Zhao J.

✓ **خلاصه پژوهش:**

Rapid, accurate detection of pathogen bacteria is a highly topical research area for the sake of food safety and public health. Surface-enhanced Raman scattering (SERS) is being considered as a powerful and attractive technique for pathogen bacteria detection, due to its sensitivity, high speed, comparatively low cost, multiplexing ability and portability. This contribution aims to give a comprehensive overview of SERS as a technique for rapid detection of pathogen bacteria based on label and label-free strategies. A brief tutorial on SERS is given first of all. Then we summarize the recent trends and developments of label and label-free based SERS applied to detection of pathogen bacteria, including the relatively complete interpretation of SERS spectra. In addition, multifunctional SERS platforms for pathogen bacteria in matrix are discussed as well. Furthermore, an outlook of the work done and a perspective on the future directions of SERS as a reliable tool for real-time pathogen bacteria detection are given. © 2017 Elsevier B.V.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1016/j.bios.2017.02.032

✓ **نام ژورنال:**

Biosensors and Bioelectronics

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

204

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Application of surface-enhanced Raman spectroscopy to biological systems

✓ **نویسندگان:**

Cotton T.M., Kim J.-H., Chumanov G.D.

✓ **خلاصه پژوهش:**

This review summarizes the literature relating to the application of surface-enhanced Raman scattering (SERS) and surface-enhanced resonance Raman scattering (SERRS) techniques to the study of biological molecules. The emphasis is on publications that have appeared during the period from 1985 to 1991. The review is divided into six major parts. First, a brief overview of the current understanding of the mechanistic aspects of SERS/SERRS is given, with an emphasis on the relationship between theoretical predictions and experimental results. The most common experimental systems (colloids, metal island films, and electrodes) are described. Studies of biological systems are described in the second (small molecules), third (DNA and proteins) and fourth (membranes proteins and membrane preparations) sections. In the fifth or conclusion section, the potential use of SERS or SERRS as a method for obtaining spectra of native biological molecules is evaluated. Finally, the sixth section describes advances in Raman instrumentation in terms of their possible impact on future applications of SERS/SERRS techniques to biological molecules. Copyright © 1991 John Wiley & Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/jrs.1250221203

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

1991

✓ **تعداد ارجاعات:**

200

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering of adsorbates

✓ **نویسندگان:**

Otto A.

✓ **خلاصه پژوهش:**

This review concentrates on the electronic contribution to surface-enhanced Raman scattering (SERS). This socalled 'chemical effect' is quantitatively separated from classical electromagnetic enhancement. It proceeds by increased electron-photon coupling at an atomically rough surface and by temporary charge transfer to adsorbate orbitals. These concepts are supported by various experimental results. The model accounts for the chemical specificity and vibrational selectivity of SERS and (partly) for the 'SERS specificity' of various metals. Copyright © 1991 John Wiley & Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/jrs.1250221204

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

1991

✓ **تعداد ارجاعات:**

199

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Effects of the excitation Wavelength on the SERS spectrum

✓ **نویسندگان:**

Álvarez-Puebla R.A.

✓ **خلاصه پژوهش:**

SERS is nowadays a well-established ultrasensitive technique with potential to solve many analytical problems, especially those related to biosciences. This Perspective article aims at summarizing the experimental complexities, in particular, those related to the interaction of light with the sample, that the SERS practitioner may find when acquiring a spectrum while providing a general basis for the interpretation of the obtained vibrational features. With such an idea in mind, factors related to the instrumentation, the optical enhancer, and the analyte molecule are discussed to illustrate the effects of the incident light on the absolute and relative intensity, as well as the spectral profile of the SERS spectra. © 2012 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/jz201625j

✓ **نام ژورنال:**

Journal of Physical Chemistry Letters

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

198

Detect Precisely

✓ عنوان پژوهش:

Measuring the transient extensional rheology of polyethylene melts using the ser universal testing platform

✓ نویسندگان:

Sentmanat M., Wang B.N., McKinley G.H.

✓ خلاصه پژوهش:

We use a new extensional rheology test fixture that has been developed for conventional torsional rheometers to measure the transient extensional stress growth in a number of different molten polyethylene samples including a linear low density polyethylene (Dow Affinity PL 1880), a low density polyethylene (Lupolen 1840H), and an ultrahigh molecular weight polyethylene (UHMWPE). The transient uniaxial extensional viscosity functions for the linear low density polyethylene (LLDPE) and low density polyethylene (LDPE) samples have both been reported previously in the literature using well-established instruments and this allows us to benchmark the performance of the new test fixture. Transient stress growth experiments are carried out over a range of Hencky strain rates from 0.003 to 30 s-1 and the data show excellent agreement with the published material functions. At deformation rates greater than 0.3 s-1 a true steady state extensional viscosity is not obtained in the LDPE samples due to the onset of necking failure inthe elongating strips of polymer; however, the limiting values of the transient extensional viscosity at the onset of sample failure agree well with previously published values for the steady state extensional viscosity. This apparent steady-state extensional viscosity first increases with deformation rate before ultimately decreasing as approximately ε̇ -0.5. In addition we perform extensional step-strain measurements at small Hencky strains and demonstrate good agreement with the relaxation modulus obtained from shear rheometry. Extensional creep measurements are performed over a range of constant imposed tensile stresses and also agree well with the measured shear creep compliance. Finally, tensile stress relaxation experiments are carried out after a range of imposed Hencky strains. These tests demonstrate that following large extensional deformations the tensile stresses relax nonlinearly and also that, beyond a critical strain, the material is unstable to viscoelastic necking and rupture. Additional transient extensional stress growth measurements using highly entangled linear UHMWPE samples show greatly reduced strains to failure, that are in agreement with the predictions of the Considere theory. © 2005 The Society of Rheology.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1122/1.1896956

✓ نام ژورنال:

Journal of Rheology

✓ سال انتشار:

2005

✓ تعداد ارجاعات:

198

✓ **عنوان پژوهش:**

Phospho-Ser/Thr-binding domains: Navigating the cell cycle and DNA damage response

✓ **نویسندگان:**

Christian Reinhardt H., Yaffe M.B.

✓ **خلاصه پژوهش:**

Coordinated progression through the cell cycle is a complex challenge for eukaryotic cells. Following genotoxic stress, diverse molecular signals must be integrated to establish checkpoints specific for each cell cycle stage, allowing time for various types of DNA repair. Phospho-Ser/Thr-binding domains have emerged as crucial regulators of cell cycle progression and DNA damage signalling. Such domains include 14-3-3 proteins, WW domains, Polo-box domains (in PLK1), WD40 repeats (including those in the E3 ligase SCF βTrCP), BRCT domains (including those in BRCA1) and FHA domains (such as in CHK2 and MDC1). Progress has been made in our understanding of the motif (or motifs) that these phospho-Ser/Thr-binding domains connect with on their targets and how these interactions influence the cell cycle and DNA damage response. © 2013 Macmillan Publishers Limited. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1038/nrm3640

✓ **نام ژورنال:**

Nature Reviews Molecular Cell Biology

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

188

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Recent advances in surface-enhanced Raman scattering detection technology for microfluidic chips

✓ **نویسندگان:**

Chen L., Choo J.

✓ **خلاصه پژوهش:**

Microfluidic chip devices and their application to sensitive chemical and biological analyses have attracted significant attention over the past decade. The miniaturization of reaction systems offers practical advantages over conventional benchtop systems. In this case, however, a highly sensitive on-chip detection method is important for the monitoring of chemical reactions as well as for the detection of analyses inside the channel because the detection volume in a micrometer-size channel is extremely small. Recently, a surface-enhanced Raman scattering (SERS) technique is being regarded as a potential candidate for the highly sensitive detection of analytes in a microfluidic chip. This review provides a general survey and an in-depth look at recent developments in SERS technigues for the biological/ environmental analysis of minute analytes in a microfluidic chip. © 2008 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1002/elps.200700554

✓ **نام ژورنال:**

Electrophoresis

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

188

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Understanding the SERS effects of single silver nanoparticles and their dimers, one at a time

✓ **نویسندگان:**

Rycenga M., Camargo P.H.C., Li W., Moran C.H., Xia Y.

✓ **خلاصه پژوهش:**

This Perspective article highlights recent developments in a class of surface-enhancedRaman scattering (SERS) experiments that aim to correlate SERS enhancement factors with the physical parameters of metal nanostructures. In a typical study, the SERS substrate is fabricated by depositing colloidal nanoparticles on a silicon wafer to obtain individual particles isolated from each other or small aggregates such as dimeric units. With the help of registration marks, the same nanoparticle, or dimer of nanoparticles, can be quickly located under a Raman microscope (for SERS spectra) and a scanning electron microscope (for structural characterization). The nanoscale characterization achieved by these studies has resulted in unparalleled investigations into the nature of polarization dependency for SERS, the hot spot nature of single nanoparticles and dimers, and the manipulation of hot spots through shape-controlled synthesis and self-assembly. We discuss the new insights that these studies have offered and the future progress that they can deliver to the advancement of SERS. © 2010 American Chemical Society.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1021/jz900286a

✓ **نام ژورنال:**

Journal of Physical Chemistry Letters

✓ **سال انتشار:**

2010

✓ **تعداد ارجاعات:**

186

✓ **عنوان پژوهش:**

Plasmonic colorimetric and SERS sensors for environmental analysis

✓ **نویسندگان:**

Wei H., Hossein Abtahi S.M., Vikesland P.J.

✓ **خلاصه پژوهش:**

The potential for water pollution outbreaks requires the development of rapid, yet simple detection methods for water quality monitoring. Plasmonic nanostructures such as gold (AuNPs) and silver (AgNPs) nanoparticles are compelling candidates for the development of highly sensitive biosensors due to their unique localized surface plasmon resonances (LSPRs). The LSPR of AuNPs and AgNPs lies in the visible and infrared light range and is sensitive to the composition, size, shape, surrounding medium, and aggregation state of these NPs. This plasmonic behavior provides the basis for fabrication of colorimetric sensors for environmental analyses. Furthermore, the LSPR also enhances the electromagnetic field near the NP surface, which provides the basis for surface-enhanced Raman spectroscopy (SERS) based detection. Organic or inorganic pollutants and pathogens can be detected and differentiated based upon the finger-print spectra that arise when they enter SERS-active hot spots. In this tutorial review, we summarize progress made towards environmental analysis based on LSPR-based colorimetric and SERS detection. The problems and challenges that have hindered the development of LSPR-based nanosensors for real-world environmental pollutant monitoring are extensively discussed. © 2015 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c4en00211c

✓ **نام ژورنال:**

Environmental Science: Nano

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

184

✓ **عنوان پژوهش:**

Plasmonic nanoprobes for SERS biosensing and bioimaging

✓ **نویسندگان:**

Vo-Dinh T., Wang H.-N., Scaffidi J.

✓ **خلاصه پژوهش:**

This article provides an overview of the development and application of plasmonic nanoprobes developed in our laboratory for biosensing and bioimaging. We describe the use of plasmonics surface-enhanced Raman scattering (SERS) gene probes for the detection of diseases using DNA hybridization to target biospecies (HIV gene, breast cancer genes etc.). For molecular imaging, we describe a hyperspectral surface-enhanced Raman imaging (HSERI) system that combines imaging capabilities with SERS detection to identify cellular components using Raman dye-labeled silver nanoparticles in cellular systems The detection of specific target DNA sequences associated with breast cancer using "molecular sentinel" nanoprobes and the use of a plasmonic nanosensor to monitor pH in single cells are presented and discussed. © 2010 by WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1002/jbio.200910015

✓ **نام ژورنال:**

Journal of Biophotonics

✓ **سال انتشار:**

2010

✓ **تعداد ارجاعات:**

183

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering biomedical applications of plasmonic colloidal particles

✓ **نویسندگان:**

Abalde-Cela S., Aldeanueva-Potel P., Mateo-Mateo C., Rodríguez-Lorenzo L., Alvarez-Puebla R.A., Liz-Marzán L.M.

✓ **خلاصه پژوهش:**

This review article presents a general view of the recent progress in the fast developing area of surface-enhanced Raman scattering spectroscopy as an analytical tool for the detection and identification of molecular species in very small concentrations, with a particular focus on potential applications in the biomedical area. We start with a brief overview of the relevant concepts related to the choice of plasmonic nanostructures for the design of suitable substrates, their implementation into more complex materials that allow generalization of the method and detection of a wide variety of (bio)molecules and the strategies that can be used for both direct and indirect sensing. In relation to indirect sensing, we devote the final section to a description of SERS-encoded particles, which have found wide application in biomedicine (among other fields), since they are expected to face challenges such as multiplexing and high-throughput screening. © 2010 The Royal Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1098/rsif.2010.0125.focus

✓ **نام ژورنال:**

Journal of the Royal Society Interface

✓ **سال انتشار:**

2010

✓ **تعداد ارجاعات:**

180

TEKSAN Detect Precisely

✓ عنوان پژوهش:

Detection of Pesticide Residues in Food Using Surface-Enhanced Raman Spectroscopy: A Review

✓ نویسندگان:

Xu M.-L., Gao Y., Han X.X., Zhao B.

✓ خلاصه پژوهش:

Pesticides directly pollute the environment and contaminate foods ultimately being absorbed by the human body. Their residues contain highly toxic substances that have been found to cause serious problems to human health even at very low concentrations. The gold standard method, gas/liquid chromatography combined with mass spectroscopy, has been widely used for the detection of pesticide residues. However, these methods have some drawbacks such as complicated pretreatment and cleanup steps. Recent technological advancements of surface-enhanced Raman spectroscopy (SERS) have promoted the creation of alternative detection techniques. SERS is a useful detection tool with ultrasensitivity and simpler protocols. Present SERS-based pesticide residue detection often uses standard solutions of target analytes in conjunction with theoretical Raman spectra calculated by density functional theory (DFT) and actual Raman spectra detected by SERS. SERS is quite a promising technique for the direct detection of pesticides at trace levels in liquid samples or on the surface of solid samples following simple extraction to increase the concentration of analytes. In this review, we highlight recent studies on SERS-based pesticide detection, including SERS for pesticide standard solution detection and for pesticides in/on food samples. Moreover, in-depth analysis of pesticide chemical structures, structural alteration during food processing, interaction with SERS substrates, and selection of SERS-active substrates is involved. © 2017 American Chemical Society.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1021/acs.jafc.7b02504

✓ نام ژورنال:

Journal of Agricultural and Food Chemistry

✓ سال انتشار:

2017

✓ تعداد ارجاعات:

172

✓ **عنوان پژوهش:**

Simple SERS substrates: Powerful, portable, and full of potential

✓ **نویسندگان:**

Betz J.F., Yu W.W., Cheng Y., White I.M., Rubloff G.W.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) is a powerful spectroscopic technique capable of detecting trace amounts of chemicals and identifying them based on their unique vibrational characteristics. While there are many complex methods for fabricating SERS substrates, there has been a recent shift towards the development of simple, low cost fabrication methods that can be performed in most labs or even in the field. The potential of SERS for widespread use will likely be realized only with development of cheaper, simpler methods. In this Perspective article we briefly review several of the more popular methods for SERS substrate fabrication, discuss the characteristics of simple SERS substrates, and examine several methods for producing simple SERS substrates. We highlight potential applications and future directions for simple SERS substrates, focusing on highly SERS active three-dimensional nanostructures fabricated by inkjet and screen printing and galvanic displacement for portable SERS analysis-an area that we believe has exciting potential for future research and commercialization. © 2014 the Owner Societies.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c3cp53560f

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

171

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface enhanced Raman spectroscopy and its application to molecular and cellular analysis

✓ **نویسندگان:**

Huh Y.S., Chung A.J., Erickson D.

✓ **خلاصه پژوهش:**

In this paper, we review the state-of-the-art in surface-enhanced Raman scattering (SERS) based optical detection techniques with an application focus on cancer diagnostics. As we describe herein, SERS has several analytical, biological and engineering advantages over other methods including extremely high sensitivity, inherent molecular specificity of unlabeled targets, and narrow spectral bands. We review advances in both in vitro and in vivo applications of SERS and examine how technical issues with the technology are being addressed. A special technology focus is given to emerging optofluidic devices which aim to merge microfluidic and optical detection technologies into simple packages. We conclude with a brief discussion of some of the emerging challenges in the field and some of the approaches that are likely to enhance their application. © Springer-Verlag 2008.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1007/s10404-008-0392-3

✓ **نام ژورنال:**

Microfluidics and Nanofluidics

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

171

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy biosensing: In vivo diagnostics and multimodal imaging

✓ **نویسندگان:**

Henry A.-I., Sharma B., Cardinal M.F., Kurouski D., Van Duyne R.P.

✓ **خلاصه پژوهش:**

This perspective presents recent developments in the application of surface-enhanced Raman spectroscopy (SERS) to biosensing, with a focus on in vivo diagnostics. We describe the concepts and methodologies developed to date and the target analytes that can be detected. We also discuss how SERS has evolved from a "point-and-shoot" stand-alone technique in an analytical chemistry laboratory to an integrated quantitative analytical tool for multimodal imaging diagnostics. Finally, we offer a guide to the future of SERS in the context of clinical diagnostics. © 2016 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.analchem.6b01597

✓ **نام ژورنال:**

Analytical Chemistry

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

170

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Nanowire-supported plasmonic waveguide for remote excitation of surface-enhanced Raman scattering

✓ **نویسندگان:**

Huang Y., Fang Y., Zhang Z., Zhu L., Sun M.

✓ **خلاصه پژوهش:**

Due to its amazing ability to manipulate light at the nanoscale, plasmonics has become one of the most interesting topics in the field of light-matter interaction. As a promising application of plasmonics, surface-enhanced Raman scattering (SERS) has been widely used in scientific investigations and material analysis. The large enhanced Raman signals are mainly caused by the extremely enhanced electromagnetic field that results from localized surface plasmon polaritons. Recently, a novel SERS technology called remote SERS has been reported, combining both localized surface plasmon polaritons and propagating surface plasmon polaritons (PSPPs, or called plasmonic waveguide), which may be found in prominent applications in special circumstances compared to traditional local SERS. In this article, we review the mechanism of remote SERS and its development since it was first reported in 2009. Various remote metal systems based on plasmonic waveguides, such as nanoparticle-nanowire systems, single nanowire systems, crossed nanowire systems and nanowire dimer systems, are introduced, and recent novel applications, such as sensors, plasmon-driven surface-catalyzed reactions and Raman optical activity, are also presented. Furthermore, studies of remote SERS in dielectric and organic systems based on dielectric waveguides remind us that this useful technology has additional, tremendous application prospects that have not been realized in metal systems.© 2014 CIOMP. All rights reserved 2047-7538/14.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1038/lsa.2014.80

✓ **نام ژورنال:**

Light: Science and Applications

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

168

✓ **عنوان پژوهش:**

Surface-Enhanced Raman Scattering (SERS) on transition metal and semiconductor nanostructures

✓ **نویسندگان:**

Wang X., Shi W., She G., Mu L.

✓ **خلاصه پژوهش:**

Surface-Enhanced Raman Scattering (SERS) spectroscopy has experienced a rapid growth over the past 30 years, and has become a valuable tool in various research areas. In conjunction with recent explosive development of nanoscience and nanotechnology, the SERS-active substrates have also expanded from traditional Group 11 metals (Au, Ag, Cu) to non-Group 11 nanostructures. This paper gives an overview of historical advances in the use of non-Group 11 nanostructures as substrates for SERS. Several possible mechanisms and important factors for SERS from non-Group 11 nanostructures are discussed in detail. The SERS from non-Group 11 nanostructures provides many significant applications in surface, interface analysis and biochemical detection. It is reasonable to believe that the advancement in the non-Group 11 nanostructures-based SERS-active substrates will lead to a more promising future for the SERS technology in surface science, spectroscopy and biomedicine. This journal is © the Owner Societies 2012.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1039/c2cp40080d

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

165

✓ **عنوان پژوهش:**

Shell-isolated nanoparticle-enhanced raman spectroscopy: Expanding the versatility of surface-enhanced raman scattering

✓ **نویسندگان:**

Anema J.R., Li J.-F., Yang Z.-L., Ren B., Tian Z.-Q.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is a powerful technique for detection and characterization because of its extremely high sensitivity and the rich structural information that it can offer. However, most SERS substrates are composed of Au, Ag, or Cu, and a lack of substrate generality has greatly limited the breadth of the use of SERS. Recently, we have devised a method by which SERS can be obtained from virtually any surface. Au nanoparticles are coated with ultrathin silica shells. The Au core provides Raman signal enhancement; the silica shell prevents the core from coming into direct contact with probe/analyte molecules or the surface over which these particles are spread (i.e., prevents the contamination of the chemical system under study). In the present review, we expand upon previous discussion of the enhancement mechanism; procedures for the synthesis and characterization of our nanoparticles; and applications in surface chemistry, electrochemistry, and inspection. Copyright © 2011 by Annual Reviews. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1146/annurev.anchem.111808.073632

✓ **نام ژورنال:**

Annual Review of Analytical Chemistry

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

165

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy: Benefits, trade-offs and future developments

✓ **نویسندگان:**

Pérez-Jiménez A.I., Lyu D., Lu Z., Liu G., Ren B.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) is a vibrational spectroscopy technique with sensitivity down to the single molecule level that provides fine molecular fingerprints, allowing for direct identification of target analytes. Extensive theoretical and experimental research, together with continuous development of nanotechnology, has significantly broadened the scope of SERS and made it a hot research field in chemistry, physics, materials, biomedicine, and so on. However, SERS has not been developed into a routine analytical technique, and continuous efforts have been made to address the problems preventing its real-world application. The present minireview focuses on analyzing current and potential strategies to tackle problems and realize the SERS performance necessary for translation to practical applications. This journal is © The Royal Society of Chemistry.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1039/d0sc00809e

✓ **نام ژورنال:**

Chemical Science

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

163

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

A review on recent advances in the applications of surface-enhanced Raman scattering in analytical chemistry

✓ **نویسندگان:**

Fan M., Andrade G.F.S., Brolo A.G.

✓ **خلاصه پژوهش:**

This review is focused on recent developments of surface-enhanced Raman scattering (SERS) applications in Analytical Chemistry. The work covers advances in the fabrication methods of SERS substrates, including nanoparticles immobilization techniques and advanced nanopatterning with metallic features. Recent insights in quantitative and sampling methods for SERS implementation and the development of new SERS-based approaches for both qualitative and quantitative analysis are discussed. The advent of methods for pre-concentration and new approaches for single-molecule SERS quantification, such as the digital SERS procedure, has provided additional improvements in the analytical figures-of-merit for analysis and assays based on SERS. The use of metal nanostructures as SERS detection elements integrated in devices, such as microfluidic systems and optical fibers, provided new tools for SERS applications that expand beyond the laboratory environment, bringing new opportunities for real-time field tests and process monitoring based on SERS. Finally, selected examples of SERS applications in analytical and bioanalytical chemistry are discussed. The breadth of this work reflects the vast diversity of subjects and approaches that are inherent to the SERS field. The state of the field indicates the potential for a variety of new SERS-based methods and technologies that can be routinely applied in analytical laboratories. © 2019 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.aca.2019.11.049

✓ **نام ژورنال:**

Analytica Chimica Acta

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

162

✓ **عنوان پژوهش:**

Towards Reliable and Quantitative Surface-Enhanced Raman Scattering (SERS): From Key Parameters to Good Analytical Practice

✓ **نویسندگان:**

Bell S.E.J., Charron G., Cortés E., Kneipp J., de la Chapelle M.L., Langer J., Procházka M., Tran V., Schlücker S.

✓ **خلاصه پژوهش:**

Experimental results obtained in different laboratories world-wide by researchers using surface-enhanced Raman scattering (SERS) can differ significantly. We, an international team of scientists with long-standing expertise in SERS, address this issue from our perspective by presenting considerations on reliable and quantitative SERS. The central idea of this joint effort is to highlight key parameters and pitfalls that are often encountered in the literature. To that end, we provide here a series of recommendations on: a) the characterization of solid and colloidal SERS substrates by correlative electron and optical microscopy and spectroscopy, b) on the determination of the SERS enhancement factor (EF), including suitable Raman reporter/probe molecules, and finally on c) good analytical practice. We hope that both newcomers and specialists will benefit from these recommendations to increase the inter-laboratory comparability of experimental SERS results and further establish SERS as an analytical tool. © 2019 The Authors. Published by Wiley-VCH Verlag GmbH & Co. KGaA.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/anie.201908154

✓ **نام ژورنال:**

Angewandte Chemie - International Edition

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

158

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Tip-enhanced Raman spectroscopy for surfaces and interfaces

✓ **نویسندگان:**

Wang X., Huang S.-C., Huang T.-X., Su H.-S., Zhong J.-H., Zeng Z.-C., Li M.-H., Ren B.

✓ **خلاصه پژوهش:**

Surface and interfaces play key roles in heterogeneous catalysis, electrochemistry and photo(electro)chemistry. Tip-enhanced Raman spectroscopy (TERS) combines plasmon-enhanced Raman spectroscopy with scanning probe microscopy to simultaneously provide a chemical fingerprint and morphological information for the sample at the nanometer spatial resolution. It is an ideal tool for achieving an in-depth understanding of the surface and interfacial processes, so that the relationship between structure and chemical performance can be established. We begin with the background of surfaces and interfaces and TERS, followed by a detailed discussion on some issues in experimental TERS, including tip preparation and TERS instrument configuration. We then focus on the progress of TERS for studying the surfaces and interfaces under different conditions, from ambient, to UHV, solid-liquid and electrochemical environments, followed by a brief introduction to the current understanding of the unprecedented high spatial resolution and surface selection rules. We conclude by discussing the future challenges for TERS practical applications in surfaces and interfaces. © 2017 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c7cs00206h

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

156

✓ **عنوان پژوهش:**

Noble metals-TiO2 nanocomposites: From fundamental mechanisms to photocatalysis, surface enhanced Raman scattering and antibacterial applications

✓ **نویسندگان:**

Prakash J., Sun S., Swart H.C., Gupta R.K.

✓ **خلاصه پژوهش:**

Plasmonic photocatalyst nanomaterials are rapidly emerging as novel materials for a number of advanced engineering applications. In the present review article, we aim to provide a comprehensive review to the scientific community consisting of interdisciplinary aspect of plasmonic photocatalyst nanocomposites and their multidisciplinary applications in the variety of fields of current interest from energy, environment to biomedical applications. An improved fundamental understanding of the coupling of different nanomaterials has shown great potential in interdisciplinary science with enhanced fundamental properties owing to their synergistic effects. TiO2 photocatalyst with noble metal nanostructures composes plasmonic photocatalyst systems, which show huge potential for multidisciplinary applications due to their high solar energy utilization. These plasmonic photocatalyst systems show enhanced transport properties and visible light activity due to the Schottky and plasmonic effects in presence of noble metal nanostructures. Engineering of their shapes and sizes causes significant variations in the physical and electrical properties adding flavor to the tunability and flexibility in multifunctional applications of the resulting nanocomposites. This not only enhances the photocatalytic and antibacterial activities of TiO2 but also extends its utilization in broad field of energy and environmental applications. The plasmonic nanostructures on TiO2 surface allow them to use as surface enhance Raman scattering (SERS) substrate for ultra-detection of bio-organic molecules. This review details on multifunctional applications with enhanced properties of noble metals-TiO2 nanocomposites in fields of photocatalysis, photovoltaic, SERS and antibacterial activities. Included are the recent developments and progress in multidisciplinary application of these plasmonic photocatalysts. The plasmonic effect and interdisciplinary research have been emphasized for multifunctionality supported by the fundamental mechanisms and theoretical explanations. Specific applications of these nanocomposites in the form of thin films or embedded in polymers have also been discussed in terms of their stability and real practical applications. © 2018 Elsevier Ltd

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.apmt.2018.02.002

✓ **نام ژورنال:**

Applied Materials Today

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

154

✓ **عنوان پژوهش:**

Review of recent progress of plasmonic materials and nano-structures for surface-enhanced raman scattering

✓ **نویسندگان:**

Wang A.X., Kong X.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has demonstrated single-molecule sensitivity and is becoming intensively investigated due to its significant potential in chemical and biomedical applications. SERS sensing is highly dependent on the substrate, where excitation of the localized surface plasmons (LSPs) enhances the Raman scattering signals of proximate analyte molecules. This paper reviews research progress of SERS substrates based on both plasmonic materials and nano-photonic structures. We first discuss basic plasmonic materials, such as metallic nanoparticles and nano-rods prepared by conventional bottom-up chemical synthesis processes. Then, we review rationally-designed plasmonic nano-structures created by top-down approaches or fine-controlled synthesis with high-density hot-spots to provide large SERS enhancement factors (EFs). Finally, we discuss the research progress of hybrid SERS substrates through the integration of plasmonic nano-structures with other nano-photonic devices, such as photonic crystals, bio-enabled nanomaterials, guided-wave systems, micro-fluidics and graphene. © 2015 by the authors.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.3390/ma8063024

✓ **نام ژورنال:**

Materials

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

153

✓ **عنوان پژوهش:**

Prospects for point-of-care pathogen diagnostics using surface-enhanced Raman scattering (SERS)

✓ **نویسندگان:**

Granger J.H., Schlotter N.E., Crawford A.C., Porter M.D.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has enabled the detection of pathogens and disease markers at extremely low levels. This review examines the potential impact of SERS in addressing unmet needs in pathogen diagnostics both in a traditional clinical setting and in the point of care (POC) arena. It begins by describing the strengths and weaknesses of today's diagnostics technologies in order to set a contextual stage for an overview which highlights a few of the many recent developments using SERS in biodefense, human and animal health, and monitoring food and water safety. These sections are followed by discussions of the challenges for the translation of these developments to POC settings, including the performance attributes and metrics for quantification of analytical and clinical figures of merit (e.g., limit of detection and clinical accuracy), and the pathways for large-scale test validation and the build-out of instrumentation and tests kits for POC deployment. © 2016 The Royal Society of Chemistry.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1039/c5cs00828j

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

151

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Protein Ser/ Thr phosphatases - The ugly ducklings of cell signalling

✓ **نویسندگان:**

Brautigan D.L.

✓ **خلاصه پژوهش:**

This review traces the historical origins and conceptual developments leading to the current state of knowledge of the three superfamilies of protein Ser/Thr phosphatases. 'PR enzyme' was identified as an enzyme that inactivates glycogen phosphorylase, although it took 10 years before this ugly duckling was recognized for its true identity as a protein Ser/Thr phosphatase. Ethanol denaturation for purification in the 1970s yielded a phosphatase that exhibited broad specificity, which was resolved into type-1 and type-2 phosphatases in the 1980s. More recent developments show that regulation and specificity are achieved through assembly of multisubunit holoenzymes, transient phosphorylation and the action of inhibitor proteins. Still not widely appreciated, there are hundreds of discrete protein Ser/ Thr phosphatases available to counteract protein kinases, offering potential therapeutic targets. Signalling networks and modelling schemes need to incorporate the full gamut of protein Ser/ Thr phosphatases and their interconnections. © 2012 The Author Journal compilation © 2012 FEBS.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1111/j.1742-4658.2012.08609.x

✓ **نام ژورنال:**

FEBS Journal

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

151

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Demonstrating Photoluminescence from Au is Electronic Inelastic Light Scattering of a Plasmonic Metal: The Origin of SERS Backgrounds

✓ **نویسندگان:**

Hugall J.T., Baumberg J.J.

✓ **خلاصه پژوهش:**

Temperature-dependent surface-enhanced Raman scattering (SERS) is used to investigate the photoluminescence and background continuum always present in SERS but whose origin remains controversial. Both the Stokes and anti-Stokes background is found to be dominated by inelastic light scattering (ILS) from the electrons in the noble metal nanostructures supporting the plasmon modes. The anti-Stokes background is highly temperature dependent and is shown to be related to the thermal occupation of electronic states within the metal via a simple model. This suggests new routes to enhance SERS sensitivities, as well as providing ubiquitous and calibrated real-time temperature measurements of nanostructures. (Figure Presented). © 2015 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.nanolett.5b00146

✓ **نام ژورنال:**

Nano Letters

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

148

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Reduced graphene oxide-supported gold nanostars for improved SERS sensing and drug delivery

✓ **نویسندگان:**

Wang Y., Polavarapu L., Liz-Marzán L.M.

✓ **خلاصه پژوهش:**

Development of novel surface-enhanced Raman scattering (SERS) substrates and how they interface target analytes plays a pivotal role in determining the spectrum profile and SERS enhancement magnitude, as well as their applications. We present here the seed-mediated growth of reduced graphene oxide-gold nanostar (rGO-NS) nanocomposites and employ them as active SERS materials for anticancer drug (doxorubicin, DOX) loading and release. By this synthetic approach, both the morphology of rGO-NS nanohybrids and the corresponding optical properties can be precisely controlled, with no need of surfactant or polymer stabilizers. The developed rGO-NS nanohybrids show tunable optical properties by simply changing growth reaction parameters, improved stability as compared to bare Au nanostars, and sensitive SERS response toward aromatic organic molecules. Furthermore, SERS applications of rGO-NS to probe DOX loading and pH-dependent release are successfully demonstrated, showing promising potential for drug delivery and chemotherapy. © 2014 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/am501382y

✓ **نام ژورنال:**

ACS Applied Materials and Interfaces

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

148

✓ **عنوان پژوهش:**

Mycobacterial Ser/Thr protein kinases and phosphatases: Physiological roles and therapeutic potential

✓ **نویسندگان:**

Wehenkel A., Bellinzoni M., Graña M., Duran R., Villarino A., Fernandez P., Andre-Leroux G., England P., Takiff H., Cerveñansky C., Cole S.T., Alzari P.M.

✓ **خلاصه پژوهش:**

Reversible protein phosphorylation is a major regulation mechanism of fundamental biological processes, not only in eukaryotes but also in bacteria. A growing body of evidence suggests that Ser/Thr phosphorylation play important roles in the physiology and virulence of Mycobacterium tuberculosis, the etiological agent of tuberculosis. This pathogen uses 'eukaryotic-like' Ser/Thr protein kinases and phosphatases not only to regulate many intracellular metabolic processes, but also to interfere with signaling pathways of the infected host cell. Disrupting such processes by means of selective inhibitors may thus provide new pharmaceutical weapons to combat the disease. Here we review the current knowledge on Ser/Thr protein kinases and phosphatases in M. tuberculosis, their regulation mechanisms and putative substrates, and we explore their therapeutic potential as possible targets for the development of new anti-mycobacterial compounds. © 2007 Elsevier B.V. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.bbapap.2007.08.006

✓ **نام ژورنال:**

Biochimica et Biophysica Acta - Proteins and Proteomics

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

143

✓ **عنوان پژوهش**:

Inhibition of the Ser-Thr phosphatases PP1 and PP2A by naturally occurring toxins

✓ **نویسندگان**:

Sheppeck II J.E., Gauss C.-M., Chamberlin A.R.

✓ **خلاصه پژوهش**:

[No abstract available]

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1016/S0968-0896(97)00146-6

✓ **نام ژورنال**:

Bioorganic and Medicinal Chemistry

✓ **سال انتشار**:

1997

✓ **تعداد ارجاعات**:

141

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Quantitative comparison of five SERS substrates: Sensitivity and limit of detection

✓ **نویسندگان:**

Norrod K.L., Sudnik L.M., Rousell D., Rowlen K.L.

✓ **خلاصه پژوهش:**

Five surface-enhanced Raman scattering (SERS) substrates were quantitatively compared for ease of preparation, sensitivity, limit of detection (LOD), reproducibility, and stability. Specifically, vapor-deposited Ag films, electrochemically roughened Ag electrodes, nitric acid-etched Ag foil, Tollens-produced Ag films, and photoreduced Ag films on TiO2 were examined. Of these substrates, post-deposition-annealed Ag films exhibited the greatest sensitivity and lowest LOD, with 152 ± 1 counts per femtomole and an LOD of 0.36 ± 0.02 femtomoles of trans-1,2-bis(4-pyridyl)ethene (BPE). The substrate demonstrating the poorest sensitivity and highest LOD was Ag deposited from the Tollens reaction, with 0.38 ± 0.01 counts per femtomole and an LOD of 270 ± 20 femtomoles of BPE. The easiest substrate to prepare, nitric acid-etched Ag foils, exhibited a sensitivity of 0.485 ± 0.008 counts per femtomole and an LOD of 200 ± 10 femtomoles of BPE.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1366/0003702971941377

✓ **نام ژورنال:**

Applied Spectroscopy

✓ **سال انتشار:**

1997

✓ **تعداد ارجاعات:**

138

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Graphene-gold nanoparticles hybrid-synthesis, functionalization, and application in a electrochemical and surface-enhanced raman scattering biosensor

✓ **نویسندگان:**

Khalil I., Julkapli N.M., Yehye W.A., Basirun W.J., Bhargava S.K.

✓ **خلاصه پژوهش:**

Graphene is a single-atom-thick two-dimensional carbon nanosheet with outstanding chemical, electrical, material, optical, and physical properties due to its large surface area, high electron mobility, thermal conductivity, and stability. These extraordinary features of graphene make it a key component for different applications in the biosensing and imaging arena. However, the use of graphene alone is correlated with certain limitations, such as irreversible self-agglomerations, less colloidal stability, poor reliability/repeatability, and non-specificity. The addition of gold nanostructures (AuNS) with graphene produces the graphene-AuNS hybrid nanocomposite which minimizes the limitations as well as providing additional synergistic properties, that is, higher effective surface area, catalytic activity, electrical conductivity, water solubility, and biocompatibility. This review focuses on the fundamental features of graphene, the multidimensional synthesis, and multipurpose applications of graphene-Au nanocomposites. The paper highlights the graphene-gold nanoparticle (AuNP) as the platform substrate for the fabrication of electrochemical and surface-enhanced Raman scattering (SERS)-based biosensors in diverse applications as well as SERS-directed bio-imaging, which is considered as an emerging sector for monitoring stem cell differentiation, and detection and treatment of cancer.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.3390/ma9060406

✓ **نام ژورنال:**

Materials

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

135

✓ **عنوان پژوهش:**

Distance and Orientation Dependence of Heterogeneous Electron Transfer: A Surface-Enhanced Resonance Raman Scattering Study of Cytochrome c Bound to Carboxylic Acid Terminated Alkanethiols Adsorbed on Silver Electrodes

✓ **نویسندگان:**

Dick L.A., Haes A.J., Van Duyne R.P.

✓ **خلاصه پژوهش:**

The distance and orientation dependence of the heterogeneous electron-transfer reaction between ferrocytochrome c (Fe2+Cc) and a silver film over nanosphere (AgFON) electrode is examined in detail using electrochemical surface-enhanced resonance Raman spectroscopy (SERRS) as a molecularly specific and structurally sensitive probe. The distance between the Fe2+ redox center and the electrode surface is controlled by varying the chain length x of an intervening carboxylic acid terminated alkanethiol, HS(CH2)xCOOH, self-assembled monolayer (SAM). The orientation of the heme in Fe2+Cc with respect to the AgFON/S(CH2)x-COOH electrode surface is controlled by its binding motif. Electrostatic binding of Fe2+Cc to AgFON/S(CH2)x-COOH yields a highly oriented redox system with the heme edge directed toward the electrode surface. The binding constants were determined to be K = 5.0 × 106 M-1 and 1.1 × 106 M-1, respectively, for the x = 5 and x = 10 SAMs. In contrast, covalent binding of Fe2+Cc yields a randomly oriented redox system with no preferred direction between the heme edge and the electrode surface. SERRS detected electrochemistry demonstrates that Fe2+Cc electrostatically bound to the x = 5 AgFON/S(CH2)xCOOH surface exhibits reversible oxidation to ferricytochrome c, whereas Fe2+Cc electrostatically bound to the x = 10 surface exhibits irreversible oxidation. In comparison, Fe2+Cc covalently bound to the x = 5 and x = 10 surfaces both exhibit oxidation with an intermediate degree of reversibility. In addition to these primary results, the work presented here shows that AgFON/S(CH2)xCOOH surfaces (1) are biocompatible - Fe2+Cc is observed in its native state and (2) are stable to supporting electrolyte changes spanning a wide range of ionic strength and pH thus enabling, for the first time, SERRS studies of these variables in a manner not accessible with either the widely used colloid or electrochemically roughened SERS-active surfaces.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/jp0029717

✓ **نام ژورنال:**

Journal of Physical Chemistry B

✓ **سال انتشار:**

2000

✓ **تعداد ارجاعات:**

135

✓ **عنوان پژوهش:**

Hybrid nanostructures for SERS: Materials development and chemical detection

✓ **نویسندگان:**

Fateixa S., Nogueira H.I.S., Trindade T.

✓ **خلاصه پژوهش:**

This review focuses on recent developments in hybrid and nanostructured substrates for SERS (surface-enhanced Raman scattering) studies. Thus substrates composed of at least two distinct types of materials, in which one is a SERS active metal, are considered here aiming at their use as platforms for chemical detection in a variety of contexts. Fundamental aspects related to the SERS effect and plasmonic behaviour of nanometals are briefly introduced. The materials described include polymer nanocomposites containing metal nanoparticles and coupled inorganic nanophases. Chemical approaches to tailor the morphological features of these substrates in order to get high SERS activity are reviewed. Finally, some perspectives for practical applications in the context of chemical detection of analytes using such hybrid platforms are presented. © the Owner Societies 2015.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c5cp01032b

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

133

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Deep learning and artificial intelligence methods for Raman and surface-enhanced Raman scattering

✓ **نویسندگان:**

Lussier F., Thibault V., Charron B., Wallace G.Q., Masson J.-F.

✓ **خلاصه پژوهش:**

Machine learning is shaping up our lives in many ways. In analytical sciences, machine learning provides an unprecedented opportunity to extract information from complex or big datasets in chromatography, mass spectrometry, NMR, and spectroscopy, among others. This is especially the case in Raman and surface-enhanced Raman scattering (SERS) techniques where vibrational spectra of complex chemical mixtures are acquired as large datasets for the analysis or imaging of chemical systems. The classical linear methods of processing the information no longer suffice and thus machine learning methods for extracting the chemical information from Raman and SERS experiments have been implemented recently. In this review, we will provide a brief overview of the most common machine learning techniques employed in Raman, a guideline for new users to implement machine learning in their data analysis process, and an overview of modern applications of machine learning in Raman and SERS. © 2019 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.trac.2019.115796

✓ **نام ژورنال:**

TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

130

TEKSAN Detect Precisely

✓ عنوان پژوهش:

Surface-enhanced Raman spectroscopy (SERS): An adventure from plasmonic metals to organic semiconductors as SERS platforms

✓ نویسندگان:

Demirel G., Usta H., Yilmaz M., Celik M., Alidagi H.A., Buyukserin F.

✓ خلاصه پژوهش:

The quantitative determination and identification of bio-/chemical molecules at ultra-low concentrations is a hot topic in several fields including medical diagnostics, environmental science, and homeland security. Molecular detection techniques are conventionally based on optical, electrochemical, electronic, or gravimetric methodologies. Among these methods, surface-enhanced Raman spectroscopy (SERS) is considered as one of the most reliable, sensitive and selective techniques for non-destructive molecular analysis through the amplification of electromagnetic fields and/or creation of charge-transfer states between the chemisorbed analyte molecule and SERS active platform. Unfortunately, the applicability of SERS is rather limited, which is mainly due to the lack of highly sensitive SERS platforms with good stability and reproducibility. In line with this, metal nanoparticles (e.g., Au, Ag, and Cu) have been extensively exploited as SERS active platforms. Although the utilization of metallic nanoparticles in SERS is simple and cost-effective, the poor controllability of the structures and limited formation of hot spots in the detection zone leads to discrepancy in the resulting SERS signals. For these reasons, in the past few years, researchers have focused on fabricating 3-dimensional (3D) SERS platforms, which increase the adsorption of analyte molecules and facilitate hot spot formation in all three dimensions. However, the fabrication of 3D SERS platforms is mostly expensive and technologically demanding. Therefore, the discovery of non-metal alternative approaches is of great interest not only to widen SERS applications but to further elucidate fundamental questions. Considering recent developments on the fabrication and application of SERS active platforms, this review is structured in 3 main directions; (1) implementation of the plasmonic nanoparticles having different shapes into SERS-active platforms, (2) highlighting recent developments in the fabrication and application of 3D SERS-active platforms, and (3) examination of recent novel inorganic and organic semiconductor based platforms for SERS applications. At the end, we conclude with the promises and challenges for the future evolution of SERS. © 2018 The Royal Society of Chemistry.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1039/c8tc01168k

✓ نام ژورنال:

Journal of Materials Chemistry C

✓ سال انتشار:

2018

✓ تعداد ارجاعات:

126

✓ **عنوان پژوهش:**

Medical applications of surface-enhanced Raman scattering

✓ **نویسندگان:**

Xie W., Schlücker S.

✓ **خلاصه پژوهش:**

This perspective article provides an overview of selected medical applications of surface-enhanced Raman scattering (SERS), highlighting recent developments and trends. The use of SERS for detection, analysis and imaging has attracted great interest in the past decade owing to its high sensitivity and molecular fingerprint specificity. SERS can deliver chemical and structural information from analytes rapidly and nondestructively in a label-free manner. Alternatively, SERS labels or nanotags, when conjugated to target-specific ligands, can be employed for the selective detection and localization of the corresponding target molecule. Biomedical applications based on both approaches are highlighted. © 2013 the Owner Societies.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c3cp43858a

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

126

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Super-resolution imaging of SERS hot spots

✓ **نویسندگان:**

Willets K.A.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) hot spots occur when molecules are positioned near regions of strongly enhanced electromagnetic fields on the surface of nano-featured plasmonic substrates. The emission from the molecule is coupled out into the far field by the plasmon modes of the substrate, but due to the diffraction-limit of light, the properties of this coupled molecule-plasmon emitter cannot be resolved using typical far-field optical microscopy techniques. However, by fitting the emission to a model function such as 2-dimensional Gaussian, the relative position of the emitter can be determined with precision better than 5 nm in a process known as super-resolution imaging. This tutorial review describes the basic principles of super-resolution imaging of SERS hot spots using single molecules to probe local electromagnetic field enhancements. New advances using dipole-based fitting functions and spectrally- and spatially-resolved measurements are described, providing new insight into SERS hot spots and the important roles of both the molecule and the substrate in defining their properties. © 2014 the Partner Organisations.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c3cs60334b

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

125

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy and microfluidic platforms: Challenges, solutions and potential applications

✓ **نویسندگان:**

Jahn I.J., Žukovskaja O., Zheng X.-S., Weber K., Bocklitz T.W., Cialla-May D., Popp J.

✓ **خلاصه پژوهش:**

The exhaustive body of literature published in the last four years on the development and application of systems based on surface-enhanced Raman spectroscopy (SERS) combined with microfluidic devices demonstrates that this research field is a current hot topic. This synergy, also referred to as lab-on-a-chip SERS (LoC-SERS) or nano/micro-optofluidics SERS, has opened the door for new opportunities where both techniques can profit. On the one hand, SERS measurements are considerably improved because the processes previously performed on a large scale in the laboratory and prone to human error can now be carried out in nanoliter volumes in an automatic and reproducible manner; on the other hand, microfluidic platforms need detection methods able to sense in small volumes and therefore, SERS is ideal for this task. The present review not only aims to provide the reader an overview of the recent developments and advancements in this field, but it also addresses the key aspects of fundamental SERS theory that influence the interpretation of SERS spectra, as well as the challenges brought about by the experimental conditions and chemometric data analysis. © 2017 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c7an00118e

✓ **نام ژورنال:**

Analyst

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

124

✓ **عنوان پژوهش:**

Direct surface-enhanced Raman scattering (SERS) spectroscopy of nucleic acids: From fundamental studies to real-life applications

✓ **نویسندگان:**

Garcia-Rico E., Alvarez-Puebla R.A., Guerrini L.

✓ **خلاصه پژوهش:**

Plasmonic optical biosensors for the analysis of nucleic acids have drawn a great deal of interest in nanomedicine because of their capability to overcome major limitations of conventional methods. Within this realm, surface-enhanced Raman scattering (SERS)-based sensing is progressively emerging as a powerful analytical tool beyond the basic grounds of academia to viable commercial products. SERS benefits from the synergistic combination between the intrinsic structural specificity and experimental flexibility of Raman spectroscopy, the extremely high sensitivity provided by plasmonic nanomaterials, and the tremendous advances in nanofabrication techniques and spectroscopic instrumentation. SERS application to nucleic acids analysis has been largely restricted to indirect sensing approaches, where a SERS reporter and oligonucleotide ligands are typically combined onto the nanomaterials to enable extrinsic detection of the target sequences. On the other hand, the acquisition of the intrinsic SERS vibrational fingerprint of nucleic acids (direct sensing) has traditionally suffered from major limitations. However, recent years have witnessed a burst of interest in this area, largely driven by the efforts to address key reproducibility and sensitivity issues. In this tutorial review, we summarize and discuss the most recent cutting-edge research in the field of direct SERS sensing of nucleic acids by coherently organising the diverse data reported in the literature in a structurally logical fashion. © 2018 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c7cs00809k

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

123

✓ **عنوان پژوهش:**

Functionalization techniques for improving SERS substrates and their applications in food safety evaluation: A review of recent research trends

✓ **نویسندگان:**

Yaseen T., Pu H., Sun D.-W.

✓ **خلاصه پژوهش:**

Background: Food safety and quality have gained much attention in recent years and the capability to evaluate food quality and safety in a sensitive, rapid, and reliable manner is of great importance in the food industry. Therefore, surface-enhanced Raman scattering (SERS) with the advantages of excellent sensitivity, high selectivity, non-destructive nature and significant enhancement to identify the target has demonstrated a great potential for quick detection of chemical contaminants, chemical constitutes, and pathogens in food samples. Scope and approach: The enhancement of Raman signals for SERS is not only related to the interactions between substrates and samples but also the functionalization of substrates to gain SERS active substrates. In the present review, different types of substrates are briefly discussed, functionalization techniques for SERS active substrates are discussed, and applications of functionalized SERS substrate in food samples are presented. Conclusions and key findings: It is evident that functionalization techniques for improving SERS substrates have given encouraging outcomes, which provides possibility for identifying multiple target analytes within a complex matrix, and thus could be used as a powerful analytical tool in real-world applications in food safety analysis as well as for enhancing food quality surveillance. © 2017 Elsevier Ltd

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.tifs.2017.12.012

✓ **نام ژورنال:**

Trends in Food Science and Technology

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

123

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface enhanced Raman spectroscopy (SERS): A novel reliable technique for rapid detection of common harmful chemical residues

✓ **نویسندگان:**

Jiang Y., Sun D.-W., Pu H., Wei Q.

✓ **خلاصه پژوهش:**

Background: The irrational usage of chemical substances including pesticides and drugs in agricultural and food production is a significant food safety issue due to its residues. Therefore, the detection of harmful residues in foods is an indispensable step for guaranteeing the consumer's health. Conventional methods, such as HPLC, GC-MS and LC-MS are accurate enough, but they fail to meet the requirements of the modern industry for rapid and on-line detection. Novel reliable techniques should thus be developed as alternatives. Scope and approach: In this review, fundamentals of surface-enhanced Raman spectroscopy (SERS) is introduced. Recent advances in its usage for detecting harmful chemical residues in agricultural products including pesticides, antibiotics and β2-adrenergic agonists are discussed by two typical ways of detection improvement, and the advantages of SERS are addressed. Finally, future trends to routine use of SERS applications in harmful residues are presented. Key findings and conclusions: SERS is a promising detection technique for the detection of common harmful chemical residues with merits of simple sampling, rapid data collection and non-destructiveness. Despite rapid developments in the technology, there is much studies should be done before SERS could be used as a daily tool for the industry. © 2018 Elsevier Ltd

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.tifs.2018.02.020

✓ **نام ژورنال:**

Trends in Food Science and Technology

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

121

✓ **عنوان پژوهش:**

The new interfacial ubiquity of surface-enhanced raman spectroscopy

✓ **نویسندگان:**

Weaver M.J., Zou S., Chan H.Y.H.

✓ **خلاصه پژوهش:**

The in situ spectroscopic characterization of interfacial and thin-film solid materials, especially in liquid, highest pressure gaseous, or other non-vacuum environments, constitutes an area of enormous chemical importance. The analytical challenge of assaying monolayer-level (or smaller) quantities of material at planar interfaces in the face of spectral interferences from the adjoining bulk phases is a daunting one. Nevertheless, methods have been developed in which the desired interfacial signals can be extracted either by means of spectral difference tactics or by selecting techniques that display intrinsic interfacial sensitivity and selectivity. An important technique in the latter category is based on surface-enhanced Raman scattering (SERS) (1- 8).

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

✓ **نام ژورنال:**

Analytical Chemistry

✓ **سال انتشار:**

2000

✓ **تعداد ارجاعات:**

118

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface- and Tip-Enhanced Raman Spectroscopy in Catalysis

✓ **نویسندگان:**

Hartman T., Wondergem C.S., Kumar N., Van Den Berg A., Weckhuysen B.M.

✓ **خلاصه پژوهش:**

Surface- and tip-enhanced Raman spectroscopy (SERS and TERS) techniques exhibit highly localized chemical sensitivity, making them ideal for studying chemical reactions, including processes at catalytic surfaces. Catalyst structures, adsorbates, and reaction intermediates can be observed in low quantities at hot spots where electromagnetic fields are the strongest, providing ample opportunities to elucidate reaction mechanisms. Moreover, under ideal measurement conditions, it can even be used to trigger chemical reactions. However, factors such as substrate instability and insufficient signal enhancement still limit the applicability of SERS and TERS in the field of catalysis. By the use of sophisticated colloidal synthesis methods and advanced techniques, such as shell-isolated nanoparticle-enhanced Raman spectroscopy, these challenges could be overcome. © 2016 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.jpclett.6b00147

✓ **نام ژورنال:**

Journal of Physical Chemistry Letters

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

116

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Ultrafast and nonlinear surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Gruenke N.L., Cardinal M.F., McAnally M.O., Frontiera R.R., Schatz G.C., Van Duyne R.P.

✓ **خلاصه پژوهش:**

Ultrafast surface-enhanced Raman spectroscopy (SERS) has the potential to study molecular dynamics near plasmonic surfaces to better understand plasmon-mediated chemical reactions such as plasmonically-enhanced photocatalytic or photovoltaic processes. This review discusses the combination of ultrafast Raman spectroscopic techniques with plasmonic substrates for high temporal resolution, high sensitivity, and high spatial resolution vibrational spectroscopy. First, we introduce background information relevant to ultrafast SERS: the mechanisms of surface enhancement in Raman scattering, the characterization of plasmonic materials with ultrafast techniques, and early complementary techniques to study molecule-plasmon interactions. We then discuss recent advances in surface-enhanced Raman spectroscopies with ultrafast pulses with a focus on the study of molecule-plasmon coupling and molecular dynamics with high sensitivity. We also highlight the challenges faced by this field by the potential damage caused by concentrated, highly energetic pulsed fields in plasmonic hotspots, and finally the potential for future ultrafast SERS studies. © The Royal Society of Chemistry 2016.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c5cs00763a

✓ **نام ژورنال:**

Chemical Society Reviews

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

115

Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman scattering (SERS) for probing internal cellular structure and dynamics

✓ **نویسندگان:**

Willets K.A.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) provides vibrational information about molecules that are located within several nanometers of the surface of a metallic nanoparticle. This review describes the various challenges and successes of applying SERS inside living cells in order to gain information about the internal structure and dynamic processes occurring in the intracellular matrix. In particular, the challenges associated with the introduction of metal nanoparticles into cells are described, as well as the complexity of interpreting SERS spectra from within complex biological environments. Strategies for understanding and improving the specificity of SERS in vivo are also presented. © Springer-Verlag 2009.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s00216-009-2682-3

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

115

TEKSAN
Detect Precisely

✓ عنوان پژوهش:

Structural modes of stabilization of permissive phosphorylation sites in protein kinases: Distinct strategies in Ser/Thr and Tyr kinases

✓ نویسندگان:

Krupa A., Preethi G., Srinivasan N.

✓ خلاصه پژوهش:

Protein kinases phosphorylate several cellular proteins providing control mechanisms for various signalling processes. Their activity is impeded in a number of ways and restored by alteration in their structural properties leading to a catalytically active state. Most protein kinases are subjected to positive and negative regulation by phosphorylation of Ser/Thr/Tyr residues at specific sites within and outside the catalytic core. The current review describes the analysis on 3D structures of protein kinases that revealed features distinct to active states of Ser/Thr and Tyr kinases. The nature and extent of interactions among well-conserved residues surrounding the permissive phosphorylation sites differ among the two classes of enzymes. The network of interactions of highly conserved Arg preceding the catalytic base that mediates stabilization of the activation segment exemplifies such diverse interactions in the two groups of kinases. The N-terminal and the C-terminal lobes of various groups of protein kinases further show variations in their extent of coupling as suggested from the extent of interactions between key functional residues in activation segment and the N-terminal αC-helix. We observe higher similarity in the conformations of ATP bound to active forms of protein kinases compared to ATP conformations in the inactive forms of kinases. The extent of structural variations accompanying phosphorylation of protein kinases is widely varied. The comparison of their crystal structures and the distinct features observed are hoped to aid in the understanding of mechanisms underlying the control of the catalytic activity of distinct subgroups of protein kinases. © 2004 Elsevier Ltd. All rights reserved.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1016/j.jmb.2004.04.043

✓ نام ژورنال:

Journal of Molecular Biology

✓ سال انتشار:

2004

✓ تعداد ارجاعات:

112

✓ **عنوان پژوهش:**

Label-free surface-enhanced Raman spectroscopy of biofluids: Fundamental aspects and diagnostic applications

✓ **نویسندگان:**

Bonifacio A., Cervo S., Sergo V.

✓ **خلاصه پژوهش:**

In clinical practice, one objective is to obtain diagnostic information while minimizing the invasiveness of the tests and the pain for the patients. To this end, tests based on the interaction of light with readily available biofluids including blood, urine, or saliva are highly desirable. In this review we examine the state of the art regarding the use of surfaceenhanced Raman spectroscopy (SERS) to investigate biofluids, focusing on diagnostic applications. First, a critical evaluation of the experimental aspects involved in the collection of SERS spectra is presented; different substrate types are introduced, with a clear distinction between colloidal and noncolloidal metal nanostructures. Then the effect of the excitation wavelength is discussed, along with anomalous bands and artifacts which might affect SERS spectra of biofluids. The central part of the review examines the literature available on the SERS spectra of blood, plasma, serum, urine, saliva, tears, and semen. Finally, diagnostic applications are critically discussed in the context of the published evidence; this section clearly reveals that SERS of biofluids is most promising as a rapid, cheap, and non-invasive tool for mass screening for cancer. © Springer-Verlag Berlin Heidelberg 2015. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

110

✓ عنوان پژوهش:

Recent progress in the applications of graphene in surface-enhanced Raman scattering and plasmon-induced catalytic reactions

✓ نویسندگان:

Kang L., Chu J., Zhao H., Xu P., Sun M.

✓ خلاصه پژوهش:

Graphene continues to attract tremendous interest, owing to its excellent optical and electronic properties. Based on its unique features, graphene has been employed in the ever-expanding research fields. Surface-enhanced Raman scattering (SERS) may be one of the significant applied fields where graphene can make a difference. Since its discovery, the SERS technique has been capable of ultra sensitively detecting chemical and biological molecules at very low concentration, even at the single molecule level, but some problems, such as irreproducible SERS signals, should be overcome before being practically applied for spectral analysis. Graphene can be a promising candidate to make up the deficiency of a conventional metal SERS substrate. Furthermore, graphene, serving as an enhancement material, is usually deemed as a chemically inert substance to isolate the interactions between metal and probe molecules. While, irradiated by laser, structure changes of graphene under specific conditions and the contributions of its high electron mobility in plasmon-induced catalytic reactions are often ignored. In this review, we mainly focus on the state-of-the-art applications of graphene in the fields of SERS and laser-induced catalytic reactions. The advances in informative Raman spectra of graphene are firstly reviewed. Then, the graphene related SERS substrates, including graphene-enhanced Raman scattering (GERS) and graphene-mediated SERS (G-SERS), are summarized. We finally highlight the catalytic reactions occurring on graphene itself and molecules adsorbed onto graphene upon laser irradiation. © The Royal Society of Chemistry 2015.

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Journal of Materials Chemistry C

✓ سال انتشار:

2015

✓ تعداد ارجاعات:

106

✓ **عنوان پژوهش:**

Chagas disease. What is known and what should be improved: A systemic review [Doença de Chagas. O que é conhecido e o que deve ser melhorado: Uma visão sistêmica]

✓ **نویسندگان:**

Coura J.R., Borges-Pereira J.

✓ **خلاصه پژوهش:**

This study consists of a broad review on what is known and what should be improved regarding knowledge of Chagas disease, not only through analysis on the main studies published on the topics discussed, but to a large extent based on experience of this subject, acquired over the past 50 years (1961-2011). Among the subjects covered, we highlight the pathogenesis and evolution of infection by Trypanosoma cruzi, drugs in use and new strategies for treating Chagas disease; the serological tests for the diagnosis and the controls of cure the infection; the regional variations in prevalence, morbidity and response to treatment of the disease; the importance of metacyclogenesis of T. cruzi in different species of triatomines and its capacity to transmit Chagas infection; the risks of adaptation of wild triatomines to human dwellings; the morbidity and need for a surveillance and control program for Chagas disease in the Amazon region and the need to prioritize initiatives for controlling Chagas disease in Latin America and Mexico and in non-endemic countries, which is today a major international dilemma. Finally, we raise the need for to create a new initiative for controlling Chagas disease in the Gran Chaco, which involves parts of Argentina, Bolivia and Paraguay.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1590/S0037-86822012000300002

✓ **نام ژورنال:**

Revista da Sociedade Brasileira de Medicina Tropical

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

104

✓ **عنوان پژوهش:**

Fundamentals and applications of SERS-based bioanalytical sensing

✓ **نویسندگان:**

Kahraman M., Mullen E.R., Korkmaz A., Wachsmann-Hogiu S.

✓ **خلاصه پژوهش:**

Plasmonics is an emerging field that examines the interaction between light and metallic nanostructures at the metal-dielectric interface. Surface-enhanced Raman scattering (SERS) is a powerful analytical technique that uses plasmonics to obtain detailed chemical information of molecules or molecular assemblies adsorbed or attached to nanostructured metallic surfaces. For bioanalytical applications, these surfaces are engineered to optimize for high enhancement factors and molecular specificity. In this review we focus on the fabrication of SERS substrates and their use for bioanalytical applications. We review the fundamental mechanisms of SERS and parameters governing SERS enhancement. We also discuss developments in the field of novel SERS substrates. This includes the use of different materials, sizes, shapes, and architectures to achieve high sensitivity and specificity as well as tunability or flexibility. Different fundamental approaches are discussed, such as label-free and functional assays. In addition, we highlight recent relevant advances for bioanalytical SERS applied to small molecules, proteins, DNA, and biologically relevant nanoparticles. Subsequently, we discuss the importance of data analysis and signal detection schemes to achieve smaller instruments with low cost for SERS-based point-of-care technology developments. Finally, we review the main advantages and challenges of SERS-based biosensing and provide a brief outlook. © 2017, Sebastian Wachsmann-Hogiu et al., published by De Gruyter. 2017.

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10.1515/nanoph-2016-0174

✓ **نام ژورنال:**

Nanophotonics

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

103

✓ **عنوان پژوهش:**

Progress toward an in vivo surface-enhanced Raman spectroscopy glucose sensor

✓ **نویسندگان:**

Lyandres O., Yuen J.M., Shah N.C., VanDuyne R.P., Walsh Jr. J.T., Glucksberg M.R.

✓ **خلاصه پژوهش:**

Background: In this report, we detail our current work towards developing a surface-enhanced Raman spectroscopy (SERS) based sensor for in vivo glucose detection. Despite years of innovations in the development of blood glucose monitors, there remains a need for accurate continuous glucose sensors to provide care to rising numbers of diagnosed diabetes patients and mitigate secondary health complications associated with this metabolic disorder. Methods: SERS is a highly specific and sensitive optical technique suitable for direct detection of glucose. The SERS effect is highly distance dependent, thus the glucose molecules need to be within a few nanometers or adsorbed to an SERS-active surface. In our sensor, this is achieved with a self-assembled monolayer (SAM) that facilitates reversible interactions between glucose molecules and the surface. The amount of glucose near the surface is proportional to its concentration in the surrounding environment. Results: We determined that the SAM-functionalized surface is stable for at least 10 days and provides rapid, reversible partitioning. In vitro experiments in bovine plasma as well as in vivo experiments in rats demonstrated quantitative detection. Conclusions: We show successful use of the SERS glucose sensor in rats, making it the first in vivo SERS sensor. Furthermore, we demonstrate free space transdermal detection of a SERS signal through the rat's skin as an initial step toward developing a transcutaneous sensor. © 2008 Mary Ann Liebert, Inc.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1089/dia.2007.0288

✓ **نام ژورنال:**

Diabetes Technology and Therapeutics

✓ **سال انتشار:**

2008

✓ **تعداد ارجاعات:**

103

✓ **عنوان پژوهش:**

Multiplex optical sensing with surface-enhanced Raman scattering: A critical review

✓ **نویسندگان:**

Rodriguez-Lorenzo L., Fabris L., Alvarez-Puebla R.A.

✓ **خلاصه پژوهش:**

Multiplex analysis permits the detection of several analytical targets at the same time. This approach may permit to draw a rapid and accurate diagnostic about the health of an individual or an environment. Among the analytical techniques with potential for multiplexing surface-enhanced Raman scattering (SERS) offer unique advantages such as ultrasensitive detection down low the deconvolution times, a unique signature containing all the vibrational information of the target molecules, and the possibility of performing the experiments even in very demanding environments such as natural or biological fluids. Here we review the late advances in multiplex SERS including the direct methods, those aided by the surface functionalization of the plasmonic nanoparticles and the use of SERS encoded particles. © 2012 Elsevier B.V.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1016/j.aca.2012.08.003

✓ **نام ژورنال:**

Analytica Chimica Acta

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

102

Detect Precisely

✓ **عنوان پژوهش:**

Surface enhanced Raman scattering for multiplexed detection

✓ **نویسندگان:**

Dougan J.A., Faulds K.

✓ **خلاصه پژوهش:**

The multiplexed detection of biological analytes from complex mixtures is of crucial importance for the future of intelligent management and detection of disease. This review focuses on recent advances in the use of surface enhanced Raman scattering (SERS) spectroscopy as an analytical technique that can deliver multiplexed detection for a variety of biological target in increasingly complex media. The use of SERS has developed from the multipelxed detection of custom dye molecules to biomolecules such as DNA and proteins. Recent work has also shown the capability of SERS multiplexing for in vivo as well as in vitro applications. © 2012 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c2an15979a

✓ **نام ژورنال:**

Analyst

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

101

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Semiconductor materials in analytical applications of surface-enhanced Raman scattering

✓ **نویسندگان:**

Ji W., Zhao B., Ozaki Y.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is increasingly becoming an important analytical technique in various fields, which can mostly be attributed to the significant evolution of SERS-active substrates. The semiconductor-based SERS technique is particularly interesting because the inherent physicochemical properties of semiconductor materials offer several possibilities for the development and improvement of SERS-based analytical techniques. According to the effect of the semiconductor materials in SERS, semiconductor-based SERS techniques can be categorized into two areas: (1) semiconductor-enhanced Raman scattering, in which a semiconductor material is directly used as a substrate for enhancing Raman signals of adsorbed molecules, and (2) semiconductor-mediated-enhanced Raman scattering, in which a semiconductor is employed as an 'antenna' or 'trap' to modulate the Raman enhancement originating from a metal substrate. While the theory on semiconductor-based SERS is still incomplete and evolving, semiconductor-based SERS techniques have already resulted in substantial progress in biological analysis, photocatalysis, solar cells, sensing, and optoelectronic devices. The aim of this review is to outline the recent progress in this emerging research field, with a special emphasis on its analytical performance and application areas. Copyright © 2015 John Wiley & Sons, Ltd.

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✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

98

✓ **عنوان پژوهش:**

Recent progress and frontiers in the electromagnetic mechanism of surface-enhanced Raman scattering

✓ **نویسندگان:**

Yamamoto Y.S., Ozaki Y., Itoh T.

✓ **خلاصه پژوهش:**

The electromagnetic (EM) enhancement of the optical responses of molecules close to plasmonic metal nanostructures has been applied for ultra-sensitive detection in vibrational spectroscopy. Recently, the research fields of EM enhancement entered a new regime wherein the enhancement effects are connected to photochemical and photobiological phenomena. For this regime, the conventional theorem used to understand the EM enhancement effect should be re-examined because the experimental conditions are beyond the assumptions in the theorem. Thus, in this review, we firstly overview and summarize the EM mechanism in surface-enhanced Raman scattering (SERS), which is the most general optical response using an EM enhancement, and determine the limitations and problems of the EM mechanism in SERS. Secondly, we discuss the necessity of re-examining the EM mechanism with respect to three breakdowns of the approximations in Fermi's golden rule: the breakdown of the molecular electronic dynamics by the ultra-fast plasmonic de-excitation, the breakdown of the weak coupling between the plasmon and molecular exciton by strong EM enhancement, and the breakdown of the selection rule of SERS by the field-gradient effect. These breakdowns allow the observation and control of molecular functions that remain hidden by previous spectroscopic methods. © 2014 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.jphotochemrev.2014.10.001

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Journal of Photochemistry and Photobiology C: Photochemistry Reviews

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

97

✓ **عنوان پژوهش:**

Why and how do the shapes of surface-enhanced Raman scattering spectra change? Recent progress from mechanistic studies

✓ **نویسندگان:**

Yamamoto Y.S., Itoh T.

✓ **خلاصه پژوهش:**

The present review is focused on understanding the enhancement mechanisms in surface-enhanced Raman scattering (SERS) from the point of view of the various spectral changes, which have brought considerable confusion in this research field and have obstructed practical SERS applications. The electromagnetic mechanism provides us with the quantitative explanation of unexpected SERS spectral changes, such as larger Raman intensities for anti-Stokes peaks than for Stokes peaks and overtone peak intensities comparable with fundamental ones. Other mechanisms classified as chemical effects, i.e. the resonance Raman and the charge transfer mechanisms, are also introduced to explain the spectral changes in SERS. These mechanisms may explain the emergence of non-totally symmetric vibrational modes in SERS spectra, which is usually forbidden in Raman spectra. Copyright © 2016 John Wiley & Sons, Ltd.

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✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

95

✓ **عنوان پژوهش:**

Recent Advances in 2D Inorganic Nanomaterials for SERS Sensing

✓ **نویسندگان:**

Karthick Kannan P., Shankar P., Blackman C., Chung C.-H.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy is a powerful and sensitive analytical tool that has found application in chemical and biomolecule analysis and environmental monitoring. Since its discovery in the early 1970s, a variety of materials ranging from noble metals to nanostructured materials have been employed as surface enhanced Raman scattering (SERS) substrates. In recent years, 2D inorganic materials have found wide use in the development of SERS-based chemical sensors owing to their unique thickness dependent physico-chemical properties with enhanced chemical-based charge-transfer processes. Here, recent advances in the application of various 2D inorganic nanomaterials, including graphene, boron nitride, semiconducting metal oxides, and transition metal chalcogenides, in chemical detection via SERS are presented. The background of the SERS concept, including its basic theory and sensing mechanism, along with the salient features of different nanomaterials used as substrates in SERS, extending from monometallic nanoparticles to nanometal oxides, is comprehensively discussed. The importance of 2D inorganic nanomaterials in SERS enhancement, along with their application toward chemical detection, is explained in detail with suitable examples and illustrations. In conclusion, some guidelines are presented for the development of this promising field in the future. © 2019 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

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Advanced Materials

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

94

✓ **عنوان پژوهش:**

Plasmonic nano-architectures for surface enhanced Raman scattering: A review

✓ **نویسندگان:**

Kumar G.V.P.

✓ **خلاصه پژوهش:**

Surface enhanced Raman scattering (SERS) is an optical spectroscopy technique with single molecule sensitivity and chemical specificity. The electromagnetic enhancement mechanism of SERS is facilitated by the localized surface plasmons of metallic nanostructures utilized in experiments. The magnitude of the local optical field created by the plasmonic nanostructure depends on parameters such as size, shape, morphology, arrangement, and local environment of the nanostructure. By tuning these parameters, electromagnetic hot spots can be created to facilitate ultra-sensitive, subwavelength SERS detection platforms. In recent years, there have been a number of innovations in nanofabrication and synthesis of plasmonic nanostructures. This has led to a variety of plasmonic nano-architectures that can be harnessed for SERS. Recently investigated plasmonic nanostructures in the context of SERS include nanosphere dimers, individual nanocubes, nanotriangular arrays, nano-pyramid shells, individual and assembly of nanorods, nanowires, and nanotips, and some unconventional nano-architectures. Challenges in fundamental and application aspects of SERS remain for future research. © 2012 Society of Photo-Optical Instrumentation Engineers.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Journal of Nanophotonics

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

93

✓ **عنوان پژوهش:**

Optofluidic platforms based on surface-enhanced Raman scattering

✓ **نویسندگان:**

Lim C., Hong J., Chung B.G., DeMello A.J., Choo J.

✓ **خلاصه پژوهش:**

We report recent progress in the development of surface-enhanced Raman scattering (SERS)-based optofluidic platforms for the fast and sensitive detection of chemical and biological analytes. In the current context, a SERS-based optofluidic platform is defined as an integrated analytical device composed of a microfluidic element and a sensitive Raman spectrometer. Optofluidic devices for SERS detection normally involve nanocolloid-based microfluidic systems or metal nanostructure-embedded microfluidic systems. In the current review, recent advances in both approaches are surveyed and assessed. Additionally, integrated real-time sensing systems that combine portable Raman spectrometers with microfluidic devices are also reviewed. Such real-time sensing systems have significant utility in environmental monitoring, forensic science and homeland defense applications. © 2010 The Royal Society of Chemistry.

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✓ **نام ژورنال:**

Analyst

✓ **سال انتشار:**

2010

✓ **تعداد ارجاعات:**

93

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Nanoparticle properties and synthesis effects on surface-enhanced Raman scattering enhancement factor: An introduction

✓ **نویسندگان:**

Israelsen N.D., Hanson C., Vargis E.

✓ **خلاصه پژوهش:**

Raman spectroscopy has enabled researchers to map the specific chemical makeup of surfaces, solutions, and even cells. However, the inherent insensitivity of the technique makes it difficult to use and statistically complicated. When Raman active molecules are near gold or silver nanoparticles, the Raman intensity is significantly amplified. This phenomenon is referred to as surface-enhanced Raman spectroscopy (SERS). The extent of SERS enhancement is due to a variety of factors such as nanoparticle size, shape, material, and configuration. The choice of Raman reporters and protective coatings will also influence SERS enhancement. This review provides an introduction to how these factors influence signal enhancement and how to optimize them during synthesis of SERS nanoparticles. © 2015 Nathan D. Israelsen et al.

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Scientific World Journal

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

92

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Recent developments in quantitative SERS: Moving towards absolute quantification

✓ **نویسندگان:**

Goodacre R., Graham D., Faulds K.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) generates molecularly specific fingerprints of analytes and when the experimental conditions are carefully controlled this is highly quantitative. This review critiques the development of quantitative SERS from simple univariate assessment of single vibrational modes to multivariate analysis of the whole spectrum for improved quantification. SERS has also been developed for direct multiplex detection and quantification of multiple analytes and this is also discussed, as is the need for LC-SERS for analyte separation should multivariate chemometric approaches fail to effect quantification. Finally, to effect absolute quantification with SERS, the concepts of isotopologues is introduced along with the standard addition method (SAM) and suitable examples that have been developed and exploit these techniques are presented. We believe that SERS will be routinely used for quantitative analysis and it is only a matter of time before this technique translates from the laboratory to the clinical environment. © 2018

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✓ **نام ژورنال:**

TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

91

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy in art and archaeology

✓ **نویسندگان:**

Pozzi F., Leona M.

✓ **خلاصه پژوهش:**

Since its introduction in the cultural heritage field, nearly 30 years ago, surface-enhanced Raman spectroscopy (SERS) has emerged as a promising analytical technique that is particularly suitable for the detection and identification of organic colorants. Its great molecular selectivity and specificity, and unparalleled sensitivity compared to other instrumental methods, have allowed researchers to successfully characterize a wide number of natural dyes and a few synthetic ones in microscopic samples from objects of artistic, historical, and archaeological significance. Continued research over the course of the past decade has led to the construction of comprehensive databases of dyes, whose adsorption and spectral properties have been investigated at length; to the comparative study of the efficiency and performance of various metal substrates; and to the evaluation of several sample treatment methods and ad-hoc analytical protocols. In addition, recent literature in the field of SERS for art and archaeology has described instrumentation and technique advancements aimed at solving the unique challenges posed by the analysis of irreplaceable objects, namely, quasi non-destructive sampling, spatial resolution improvement, examination of insoluble compounds, and resolution of dye mixtures. Reviewing the most salient methodological and technological milestones that have traced the history of SERS for cultural heritage to date, the present article is intended as a practical resource for those researchers who would like to undertake systematic characterization of organic colorants from artworks using this powerful technique. Copyright © 2015 John Wiley & Sons, Ltd.

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✓ **نام ژورنال:**

Journal of Raman Spectroscopy

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2016

✓ **تعداد ارجاعات:**

91

✓ **عنوان پژوهش:**

SERS nanoparticles: A new optical detection modality for cancer diagnosis

✓ **نویسندگان:**

Sha M.Y., Xu H., Penn S.G., Cromer R.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is an optical detection technique that offers advantages over traditional assay detection technologies, such as fluorescence and chemiluminescence. These advantages include sensitivity, high levels of multiplexing, robustness and ability to perform detection in blood and other biological matrices. Here, we report on the growing field of SERS-active nanoparticles as a novel method for detection, with special emphasis on their use in the field of oncology. We discuss examples of SERS-active nanoparticles used in an assa for PSA, BRCA1 and Her-2, along with examples of nucleic-acid detection. We present data on a novel homogeneous, single-tube, rapid assay for nucleic acid detection and show how it will benefit the oncology community. © 2007 Future Medicine Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Nanomedicine

✓ **سال انتشار:**

2007

✓ **تعداد ارجاعات:**

89

TEKSAN
Detect Precisely

✓ عنوان پژوهش:

Advances in surface-enhanced Raman spectroscopy (SERS) substrates for lipid and protein characterization: Sensing and beyond

✓ نویسندگان:

Bruzas I., Lum W., Gorunmez Z., Sagle L.

✓ خلاصه پژوهش:

Surface-enhanced Raman spectroscopy (SERS) has become an essential ultrasensitive analytical tool for biomolecular analysis of small molecules, macromolecular proteins, and even cells. SERS enables label-free, direct detection of molecules through their intrinsic Raman fingerprint. In particular, protein and lipid bilayers are dynamic three-dimensional structures that necessitate label-free methods of characterization. Beyond direct detection and quantitation, the structural information contained in SERS spectra also enables deeper biophysical characterization of biomolecules near metallic surfaces. Therefore, SERS offers enormous potential for such systems, although making measurements in a nonperturbative manner that captures the full range of interactions and activity remains a challenge. Many of these challenges have been overcome through advances in SERS substrate development, which have expanded the applications and targets of SERS for direct biomolecular quantitation and biophysical characterization. In this review, we will first discuss different categories of SERS substrates including solution-phase, solid-supported, tip-enhanced Raman spectroscopy (TERS), and single-molecule substrates for biomolecular analysis. We then discuss detection of protein and biological lipid membranes. Lastly, biophysical insights into proteins, lipids and live cells gained through SERS measurements of these systems are reviewed. © The Royal Society of Chemistry 2018.

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Analyst

✓ سال انتشار:

2018

✓ تعداد ارجاعات:

88

✓ **عنوان پژوهش:**

SERS-microfluidic systems: A potential platform for rapid analysis of food contaminants

✓ **نویسندگان:**

Pu H., Xiao W., Sun D.-W.

✓ **خلاصه پژوهش:**

Background Surface-enhanced Raman spectroscopy (SERS) techniques are becoming increasingly widespread and accessible for accurate and specific identification of chemical or microbiological contaminants in foodstuffs. However, the consistency and repeatability of SERS-based techniques is a challenge due to complicated detection environments. This drawback can be overcome by integrating the SERS detection into a microfluidic platform, which can provide a continuous flow condition for highly reproducible SERS measurements. Furthermore, the SERS-microfluidic platform can perform elaborating sample pre-treatments, showing great potentials for on-situ analysis of food contaminants. Scope and approach This review mainly summarizes the principles and methods of SERS-microfluidic systems, as well as their applications in rapid analysis of food contaminants. Three ways of integrating SERS substrate into microfluidic channels are highlighted. Finally, the main challenges and future efforts in developing SERS-microfluidic systems for on-situ food contaminants detection are discussed. Key findings and conclusions SERS-microfluidic platform conforms to the development tendency of modern analytical technology, and has great potentials for rapid analysis of food contaminants.
© 2017 Elsevier Ltd

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✓ **نام ژورنال:**

Trends in Food Science and Technology

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

87

✓ **عنوان پژوهش:**

Surface plasmon-driven photocatalysis in ambient, aqueous and high-vacuum monitored by SERS and TERS

✓ **نویسندگان:**

Zhang Z., Xu P., Yang X., Liang W., Sun M.

✓ **خلاصه پژوهش:**

There has been an explosion of interests and activities on plasmon-driven catalytic reactions currently, which has been expanded photonic catalysis to plasmonic catalysis. Particularly, plasmonic catalysis, with activation energy provided by plasmon-induced hot electrons, can exhibit a giant catalytic action on the surface of silver or gold nanostructures, thus breaking the longstanding limitation of photonic catalysis that needs UV light generality. This new surface catalysis has been revealed in various chemical reactions by using surface-enhanced Raman scattering (SERS) and tip-enhanced Raman scattering (TERS), which are the two representative techniques supporting the hot electrons (holes) generated from plasmon-decay on plamonic nanostructures' surface. In this review, we fully explore the principle of plamonic catalysis, and especially review the advances of plasmon-driven surface catalytic reactions monitoring by SERS and TERS in atmosphere, aqueous and high-vacuum environments. These approaches significantly broaden the applications of plasmonic catalysis such as dissociation of hydrogen, water splitting and hydrocarbon conversion. © 2016 Elsevier B.V.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1016/j.jphotochemrev.2016.04.001

✓ **نام ژورنال:**

Journal of Photochemistry and Photobiology C: Photochemistry Reviews

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

87

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Ser/Thr phosphorylation as a regulatory mechanism in bacteria

✓ **نویسندگان:**

Dworkin J.

✓ **خلاصه پژوهش:**

This review will discuss some recent work describing the role of Ser/Thr phosphorylation as a post-translational mechanism of regulation in bacteria. I will discuss the interaction between bacterial eukaryotic-like Ser/Thr kinases (eSTKs) and two-component systems as well as hints as to physiological function of eSTKs and their cognate eukaryotic-like phosphatases (eSTPs). In particular, I will highlight the role of eSTKs and eSTPs in the regulation of peptidoglycan metabolism and protein synthesis. In addition, I will discuss how data from phosphoproteomic surveys suggest that Ser/Thr phosphorylation plays a much more significant physiological role than would be predicted simply based on in vivo and in vitro analyses of individual kinases. © 2015 Elsevier Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.mib.2015.01.005

✓ **نام ژورنال:**

Current Opinion in Microbiology

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

87

Detect Precisely

✓ **عنوان پژوهش:**

Surface enhanced Raman scattering in electrochemical systems: The complex roles of surface roughness

✓ **نویسندگان:**

Pemberton J.E., Guy A.L., Sobocinski R.L., Tuschel D.D., Cross N.A.

✓ **خلاصه پژوهش:**

A series of experiments designed to elucidate the presence and properties of large-scale and atomic-scale roughness produced on Ag electrodes with electrochemical oxidation-reduction cycle (ORC) pretreatments are presented. This report reviews surface enhanced Raman scattering (SERS) and scanning electron microscopic (SEM) characterization of Ag electrodes roughened with controlled-rate ORCs, and presents new results for the laser-induced thermal decay of SERS as a probe of Ag surface active sites and differential reflectance spectroscopy of electrochemically roughened Ag electrodes. These results are interpreted in terms of the presence and properties of both large-scale and atomic-scale roughness on these surfaces. © 1988.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/0169-4332(88)90072-4

✓ **نام ژورنال:**

Applied Surface Science

✓ **سال انتشار:**

1988

✓ **تعداد ارجاعات:**

87

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Gold Nanorod-pNIPAM Hybrids with Reversible Plasmon Coupling: Synthesis, Modeling, and SERS Properties

✓ **نویسندگان:**

Fernández-López C., Polavarapu L., Solís D.M., Taboada J.M., Obelleiro F., Contreras-Cáceres R., Pastoriza-Santos I., Pérez-Juste J.

✓ **خلاصه پژوهش:**

The thermoresponsive optical properties of Au nanorod-doped poly(N-isopropylacrylamide) (Au NR-pNIPAM) microgels with different Au NR payloads and aspect ratios are presented. Since the volume phase transition of pure pNIPAM microgels is reversible, the optical response reversibility of Au NR-pNIPAM hybrids is systematically analyzed. Besides, extinction cross-section and near-field enhancement simulations for Au NR-microgel hybrids are performed using a new numerical method based on the surface integral equation method of moments formulation (M3 solver). Additionally, the Au NR-microgel hybrid systems are expected to serve as excellent broadband surface-enhanced Raman scattering (SERS) substrates due to the temperature-controlled formation of hot spots and the tunable optical properties. The optical enhancing properties related to SERS are tested with three laser lines, evidencing excitation wavelength-dependent efficiency that can be easily controlled by either the aspect ratio (length/width) of the assembled Au NR or by the Au NR payload per microgel. Finally, the SERS efficiency of the prepared Au NR-pNIPAM hybrids is found to be stable for months.
© 2015 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/am5087209

✓ **نام ژورنال:**

ACS Applied Materials and Interfaces

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

86

✓ **عنوان پژوهش:**

Surface-enhanced raman scattering: Realization of localized surface plasmon resonance using unique substrates and methods

✓ **نویسندگان:**

Hossain M.K., Kitahama Y., Huang G.G., Han X., Ozaki Y.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) enhancement and the reproducibility of the SERS signal strongly reflect the quality and nature of the SERS substrates because of diverse localized surface plasmon resonance (LSPR) excitations excited at interstitials or sharp edges. LSPR excitations are the most important ingredients for achieving huge enhancements in the SERS process. In this report, we introduce several gold and silver nanoparticle-based SERS-active substrates developed solely by us and use these substrates to investigate the influence of LSPR excitations on SERS. SERS-active gold substrates were fabricated by immobilizing colloidal gold nanoparticles on glass slides without using any surfactants or electrolytes, whereas most of the SERS-active substrates that use colloidal gold/silver nanoparticles are not free of surfactant. Isolated aggregates, chain-like elongated aggregates and two-dimensional (2D) nanostructures were found to consist mostly of monolayers rather than agglomerations. With reference to correlated LSPR and SERS, combined experiments were carried out on a single platform at the same spatial position. The isolated aggregates mostly show a broadened and shifted SPR peak, whereas a weak blue-shifted peak is observed near 430 nm in addition to broadened peaks centered at 635 and 720 nm in the red spectral region in the chain-like elongated aggregates. In the case of 2D nanostructures, several SPR peaks are observed in diverse frequency regions. The characteristics of LSPR and SERS for the same gold nanoaggregates lead to a good correlation between SPR and SERS images. The elongated gold nanostructures show a higher enhancement of the Raman signal than the the isolated and 2D samples. In the case of SERS-active silver substrates for protein detection, a new approach has been adopted, in contrast to the conventional fabrication method. Colloidal silver nanoparticles are immobilized on the protein functionalized glass slides, and further SERS measurements are carried out based on LSPR excitations. A new strategy for the detection of biomolecules, particularly glutathione, under aqueous conditions is proposed. Finally, supramolecular J-aggregates of ionic dyes incorporated with silver colloidal aggregates are characterized by SERS measurements and correlated to finite-difference time-domain analysis with reference to LSPR excitations. © 2009 Springer-Verlag.

TEKSAN
Detect Precisely

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s00216-009-2762-4

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

85

✓ **عنوان پژوهش:**

Surface enhanced Raman scattering for narcotic detection and applications to chemical biology

✓ **نویسندگان:**

Ryder A.G.

✓ **خلاصه پژوهش:**

Raman spectroscopy is rapidly finding favour for applications in the life science because of the ease with which it can be used to extract significant data from tissue and cells. However, the Raman effect is an inherently weak effect, which hinders the analysis of low concentration analytes. Raman sensitivity can be improved via the surface enhanced Raman scattering (SERS) effect. In SERS, Raman spectra are dramatically amplified when a molecule is adsorbed onto nano-roughened noble metal surfaces such as silver and gold. The degree of enhancement enables single-molecule detection, which offers the potential for the unambiguous identification of analytes at concentrations that are useful in both a forensic and a chemical biology context. Here we discuss some of the practical applications of SERS to both low-level narcotic detection, and how this can be applied to chemical biology. © 2005 Elsevier Ltd. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.cbpa.2005.07.001

✓ **نام ژورنال:**

Current Opinion in Chemical Biology

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

84

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Applications of Raman and surface-enhanced Raman scattering spectroscopy in medicine

✓ **نویسندگان:**

Nabiev I., Chourpa I., Manfait M.

✓ **خلاصه پژوهش:**

The first part of this review is devoted to medical applications of Raman spectroscopy as a diagnostic or analytical tool. Studies of human arteries, ocular lenses, living cells and chromosomes are reviewed, in addition to recent advantages in cancer diagnostics using Raman spectroscopy. The second and major part is devoted to a relatively new field, surface-enhanced Raman scattering (SERS) spectroscopy of biomedical species. The SERS effect is accompanied by strong quenching of fluorescence and so enabes the range of species that can be investigated by Raman technique to be extended. The ultra-high sensitivity of SERS enables spectra to be obtained at concentrations down to 10–10 M. A wide range of experiments designed to probe the structure, topology and composition of biomedical species using SERS spectroscopy can be envisioned. Some of these currently being studied are: the determination of the distribution of drugs within a living cell and on the cellular membrane, the selective study of cell membrane components, the analysis of crude biomedical mixtures and extracts and new techniques, based on SERS spectroscopy, Fourier transform SERS spectroscopy and the SERS microprobe method. Copyright © 1994 John Wiley & Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/jrs.1250250104

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

1994

✓ **تعداد ارجاعات:**

83

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Review—surface-enhanced raman scattering sensors for food safety and environmental monitoring

✓ **نویسندگان:**

Tang H., Zhu C., Meng G., Wu N.

✓ **خلاصه پژوهش:**

This article gives a review of surface-enhanced Raman scattering (SERS) sensors for food safety and environmental pollution monitoring. It introduces the basic concepts of SERS substrates, SERS enhancement factors and mechanisms, SERS probes/labels, molecular recognition elements as well as optofluidic SERS devices (SERS sensors integrated with microfluidics). This article places an emphasis on the design strategies of various SERS sensors by utilizing fingerprinting SERS spectra or by using SERS probes. It highlights the applications of SERS sensors in detection of heavy metals (such as Hg2+, Pb2+, Cd2+ and As3+), inorganic anions (nitrite, nitrate, perchlorate and fluoride), toxic small molecules (polycyclic aromatic hydrocarbon, polychlorinated biphenyls, herbicides, pesticides, antibiotics and food additives), as well as pathogens (bacteria and viruses). © The Author(s) 2018.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1149/2.0161808jes

✓ **نام ژورنال:**

Journal of the Electrochemical Society

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

82

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Structure/function studies of Ser/Thr and Tyr protein phosphorylation in Mycobacterium tuberculosis

✓ **نویسندگان:**

Greenstein A.E., Grundner C., Echols N., Gay L.M., Lombana T.N., Miecskowski C.A., Pullen K.E., Sung P.-Y., Alber T.

✓ **خلاصه پژوهش:**

Many bacterial species express 'eukaryotic-like' Ser/Thr or Tyr protein kinases and phosphatases that are candidate mediators of developmental changes and host/ pathogen interactions. The biological functions of these systems are largely unknown. Recent genetic, biochemical and structural studies have begun to establish a framework for understanding the systems for Ser/Thr and Tyr protein phosphorylation in Mycobacterium tuberculosis (Mtb). Ser/Thr protein kinases (STPKs) appear to regulate diverse processes including cell division and molecular transport. Proposed protein substrates of the STPKs include putative regulatory proteins, as well as six proteins containing Forkhead-associated domains. Structures of domains of receptor STPKs and all three Mtb Ser/Thr or Tyr phosphatases afford an initial description of the principal modules that mediate bacterial STPK signaling. These studies revealed that universal mechanisms of regulation and substrate recognition govern the functions of prokaryotic and eukaryotic STPKs. Several structures also support novel mechanisms of regulation, including dimerization of STPKs, metal-ion binding to PstP and substrate mimicry in PtpB.
Copyright © 2005 S. Karger AG.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1159/000089645

✓ **نام ژورنال:**

Journal of Molecular Microbiology and Biotechnology

✓ **سال انتشار:**

2006

✓ **تعداد ارجاعات:**

82

✓ **عنوان پژوهش:**

In situ Raman and surface-enhanced Raman spectroscopy on working electrodes: Spectroelectrochemical characterization of water oxidation electrocatalysts

✓ **نویسندگان:**

Joya K.S., Sala X.

✓ **خلاصه پژوهش:**

In situ Raman and surface-enhanced Raman scattering (SERS) are established vibrational spectroscopic techniques with a wide range of applications in the field of chemical, material and life sciences. Their particular characteristics make them especially useful when dealing with catalytic water oxidation at anodes. The in situ characterization of the fate of electrocatalysts (whether molecular or oxide materials) employed under reaction conditions is crucial to determine the chemical identity and the physical state of the actual catalytic species. Such studies also help in both, attaining mechanistic insights underlying the catalytic reaction and confirming/discarding the possibility of molecular to colloidal or heterogeneous phase conversions taking place prior or under turnover conditions. This perspective article highlights the use of in situ Raman and SERS as principal spectroscopic tools in the electrocatalysis field by means of recent contributions where they are employed to in operando characterize both molecular and oxide-based water oxidation electrocatalysts. These in situ spectroscopic measurements support in assessing both the progressive oxidation and the structural evolution of the employed catalytic species under electrochemical conditions. Therefore, this article provides an informative guideline for developing in situ spectroelectrochemical methods to study and characterize water oxidation catalysis at working anodes. © the Owner Societies 2015.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c4cp05053c

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

81

✓ **عنوان پژوهش:**

Shedding light on surface-enhanced raman scattering hot spots through single-molecule super-resolution imaging

✓ **نویسندگان:**

Willets K.A., Stranahan S.M., Weber M.L.

✓ **خلاصه پژوهش:**

Super-resolution imaging has recently been utilized to develop a better understanding of the properties of surface-enhanced Raman scattering (SERS) hot spots. SERS hot spots are much smaller than the diffraction limit of light, and therefore, obtaining a clear picture of the enhanced electromagnetic (EM) fields comprising these hot spots is a challenging task. In this Perspective, we discuss recent work applying super-resolution imaging to single-molecule SERS (SM-SERS) of rhodamine 6G (R6G) adsorbed to randomly assembled silver colloidal aggregates, allowing the shape, size, and local enhancement of the hot spots to be imaged with <5 nm resolution. The results are compared with studies applying super-resolution imaging to surface-enhanced fluorescence (SEF) of analytes diffusing into silver nanoparticle hot spots. Both studies show a strong correlation between emission intensity and position, allowing the EM field enhancements of SERS hot spots to be mapped with sub-5 nm resolution. © 2012 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/jz300110x

✓ **نام ژورنال:**

Journal of Physical Chemistry Letters

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

80

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Single-molecule surface-enhanced Raman spectroscopy: A perspective on the current status

✓ **نویسندگان:**

Lee H.M., Jin S.M., Kim H.M., Suh Y.D.

✓ **خلاصه پژوهش:**

This perspective presents an overview of single-molecule surface-enhanced Raman scattering (sm-SERS). Our overview is organized as a brief theoretical background, discussion of the factors that enhance SERS, various experimental preparations for inserting a single molecule in a hot spot, recent sm-SERS experiments, and a perspective. Although, there have been numerous review papers on sm-SERS, we mainly concentrated on the logical development of sm-SERS on the basis of the fundamental concepts and their physical significance, so that readers outside this field can understand the motivation and the underlying physics when describing current sm-SERS measurements. Indeed, understanding such current sm-SERS experiments conducted by representative groups would be very helpful for readers to answer for themselves the fundamental and practical questions surrounding sm-SERS: (1) what information can sm-SERS provide? (2) Which factors based on the SERS mechanism should be considered to significantly amplify the SERS signal? (3) What kinds of related microscopy techniques could be combined with sm-SERS to attain more meaningful results? (4) Which statistical approaches can be used and how they can be applied to properly analyze sm-SERS data? We hope that this review article can help readers answer these questions. © 2013 the Owner Societies.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c3cp44463e

✓ **نام ژورنال:**

Physical Chemistry Chemical Physics

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

79

✓ **عنوان پژوهش:**

Label-free detection in biological applications of surface-enhanced Raman scattering

✓ **نویسندگان:**

Han X.X., Ozaki Y., Zhao B.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is currently undergoing rapid development as an ultra-sensitive analytical technique in the biological field. Label-free and extrinsic SERS labeling are two independent approaches that are commonly used to detect biomolecules directly and indirectly. The label-free detection method is a direct, convenient method for the detection of biomolecules and is more reliable than extrinsic SERS labeling, but its major limitations are poor selectivity in some complex mixtures and poor sensitivity at relatively low sample concentrations.However, label-free, highly sensitive, selective detection of biomolecules based on SERS is possible. With the development of novel SERS-active substrates, Raman instruments, and methods for sample pretreatment, the label-free protocol is becoming increasingly powerful and promising.This review highlights recent developments in label-free SERS-based techniques for bimolecular detection, including direct biomolecule identification, biomolecule-ligand recognition via spectral differences among molecular bridges, and indirect phenolic molecule detection based on azo couplings. © 2012 Elsevier Ltd.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1016/j.trac.2012.05.006

✓ **نام ژورنال:**

TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

77

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy toward application in plasmonic photocatalysis on metal nanostructures

✓ **نویسندگان:**

Chen X.-J., Cabello G., Wu D.-Y., Tian Z.-Q.

✓ **خلاصه پژوهش:**

Among photothermal, photovoltaic and photochemical techniques, photochemistry is superior in energy storage and transportation by converting photons into chemical fuels. Recently plasmonic photocatalysis, based on localized surface plasmon resonance (LSPR) generated from noble metal nanostructures, has attracted much attention. It promotes photochemical reaction efficiency by optimizing the solar spectrum absorption and the surface reaction kinetics. The deeper understanding is in urgent need for the development of novel plasmonic photocatalysts. Surface-enhanced Raman spectroscopy (SERS), which is also originated from the LSPR effect, provides an excellent opportunity to probe and monitor plasmonic photoreactions in situ and in real-time, with a very high surface sensitivity and energy resolution. Here, fundamentals of plasmonic photocatalysis and SERS are first presented based on their connections to the LSPR effect. Following by a validity analysis, latest studies of SERS applied for the plasmon mediated photochemical reaction are reviewed, focusing on the reaction kinetics and mechanism exploration. Finally, limitations of the present study, as well as the future research directions, are briefly analyzed and discussed. © 2014 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.jphotochemrev.2014.10.003

✓ **نام ژورنال:**

Journal of Photochemistry and Photobiology C: Photochemistry Reviews

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

75

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Optical fibre SERS sensors

✓ **نویسندگان:**

Stoddart P.R., White D.J.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has established itself as an important analytical technique. However, efforts to transfer the technology from the laboratory to the production line, clinic or field have been frustrated by the lack of robust affordable substrates and the complexity of interfacing between sample and spectrometer. Prompted by the success of optical fibre systems for implementing normal Raman scattering spectroscopy in remote locations and biomedical applications, attention has now shifted to the development of SERS-active optical fibres. Other workers have attempted to develop SERS probes with extended interaction lengths and both far-field and near-field SERS imaging techniques for high-resolution chemical mapping of surfaces. This review discusses the development of these technologies and presents the current state of the art. Although recent developments show great promise, some outstanding challenges and opportunities remain to be addressed. © 2009 Springer-Verlag.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s00216-009-2797-6

✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

75

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Recent progress on graphene-based substrates for surface-enhanced Raman scattering applications

✓ **نویسندگان:**

Lai H., Xu F., Zhang Y., Wang L.

✓ **خلاصه پژوهش:**

Since the intriguing and inspiring discovery of graphene-enhanced Raman scattering (GERS) in 2010, graphene and graphene-based substrates have attracted significant attention in both theoretical research and application exploration of surface-enhanced Raman scattering (SERS); this makes graphene-involved SERS a burgeoning area in many scientific branches. The introduction of graphene not only overcomes some intrinsic drawbacks of SERS, but also has a great synergistic effect with traditional noble metal nanoparticle enhancement substrates and thus greatly improves the sensing performance of SERS and largely expands its application area. To better learn about the recent progress in graphene-based SERS substrates and shed light on future research, an overview of graphene and graphene-based SERS substrates is presented herein. In this review, the role played by graphene in graphene-based SERS substrates is first summarized, and then, the classification and preparation methods of graphene-based substrates are presented, which are helpful for understanding the structure-property relationship. Furthermore, the SERS applications of graphene-based substrates in biomedical areas, including biomolecule detection, bio-imaging, cancer diagnosis and therapy and drug delivery, are highlighted. Other applications in hot-topic areas such as food safety and environmental monitoring are also briefly discussed. Finally, challenges and perspectives on the deficiencies, future development and achievements are presented.
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10.1039/c8tb00902c

✓ **نام ژورنال:**

Journal of Materials Chemistry B

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

74

✓ **عنوان پژوهش:**

SERS-based ultrasensitive sensing platform: An insight into design and practical applications

✓ **نویسندگان:**

Yuan Y., Panwar N., Yap S.H.K., Wu Q., Zeng S., Xu J., Tjin S.C., Song J., Qu J., Yong K.-T.

✓ **خلاصه پژوهش:**

Ultrasensitive detection of chemicals and biological analytes in trace or single molecular level is highly desirable in both scientific and technological fields, e.g., analytical chemistry, life science, materials science, biomedical diagnostics, and forensic science, etc. With high sensitivity, high specificity, narrow line-widths, and multiplexed non-destructive testing capabilities, surface enhanced Raman scattering (SERS)-based sensing is the most promising approach to monitor targeted analytes in the vicinity of nanostructured surface. An insight into the recent advances of SERS-based ultrasensitive sensing platform can provide an effective reference guideline to develop an optimal detection approach for arising real-world applications. Many SERS-based review articles mainly focus on the fundamental theory of SERS, nanostructured plasmonic SERS sensors, and single molecule SERS detection. However, no comprehensive review article targeting SERS-based ultrasensitive detection strategies, their working mechanisms and illustrative practical applications has been reported yet. Hence, it is important to project the latest SERS-based ultrasensitive detection research in a review, which will present a reference guideline to develop an optimal detection approach for specific detection or monitoring of analytes in highly diluted solutions. We present a systematic classification and discussion on the recent multiple strategies to achieve ultra-high SERS detection sensitivity. We also outline a detailed analysis on the up-to-date applications in vitro and in vivo. Finally, we also discuss a new trend in SERS-based ultrasensitive sensing applications. © 2017 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.ccr.2017.02.006

✓ **نام ژورنال:**

Coordination Chemistry Reviews

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

74

✓ **عنوان پژوهش:**

SERS-Enabled Lab-on-a-Chip Systems

✓ **نویسندگان:**

Huang J.-A., Zhang Y.-L., Ding H., Sun H.-B.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) has been combined with microfluidic Lab-on-a-Chip (LoC) systems for sensitive optofluidic detection for more than a decade. However, most microfluidic SERS devices still suffer from analyte contamination and signal irreproducibility. In recent years, both the microfluidics and SERS communities have developed their own solutions that are complementary to each other; their combination even has potential for commercialization. In this review, the recent advances in both fields are summarized with regard to the development of reliable multifunctional SERS-enabled LoC systems and their broad applications. Starting from SERS fundamentals, reproducible SERS substrates and dynamic microfluidic trapping are discussed. Based on their combination, on-chip applications beyond SERS are presented, and insight can be gained into the commercialization of portable SERS chips. © 2015 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

10.1002/adom.201400534

✓ **نام ژورنال:**

Advanced Optical Materials

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

74

✓ **عنوان پژوهش:**

Molecular imaging with SERS-active nanoparticles

✓ **نویسندگان:**

Zhang Y., Hong H., Myklejord D.V., Cai W.

✓ **خلاصه پژوهش:**

Raman spectroscopy has been explored for various biomedical applications (e.g., cancer diagnosis) because it can provide detailed information on the chemical composition of cells and tissues. For imaging applications, several variations of Raman spectroscopy have been developed to enhance its sensitivity. To date, a wide variety of molecular targets and biological events have been investigated using surface-enhanced Raman scattering (SERS)-active nanoparticles. The superb multiplexing capability of SERS-based Raman imaging, already successfully demonstrated in live animals, can be extremely powerful in future research where different agents can be attached to different Raman tags to enable the simultaneous interrogation of multiple biological events. Over the last several years, molecular imaging with SERS-active nanoparticles has advanced significantly and many pivotal proof-of-principle experiments have been successfully carried out. It is expected that SERS-based imaging will continue to be a dynamic research field over the next decade. SERS-active nanoparticles have been conjugated with various targeting ligands for molecular imaging applications. This review presents recent progress in this field. © 2011 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/smll.201100597

✓ **نام ژورنال:**

Small

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

74

✓ **عنوان پژوهش:**

Surface Enhanced Raman Scattering Revealed by Interfacial Charge-Transfer Transitions

✓ **نویسندگان:**

Cong S., Liu X., Jiang Y., Zhang W., Zhao Z.

✓ **خلاصه پژوهش:**

Surface enhanced Raman scattering (SERS) is a fingerprint spectral technique whose performance is highly dependent on the physicochemical properties of the substrate materials. In addition to the traditional plasmonic metal substrates that feature prominent electromagnetic enhancements, boosted SERS activities have been reported recently for various categories of non-metal materials, including graphene, MXenes, transition-metal chalcogens/oxides, and conjugated organic molecules. Although the structural compositions of these semiconducting substrates vary, chemical enhancements induced by interfacial charge transfer are often the major contributors to the overall SERS behavior, which is distinct from that of the traditional SERS based on plasmonic metals. Regarding charge-transfer-induced SERS enhancements, this short review introduces the basic concepts underlying the SERS enhancements, the most recent semiconducting substrates that use novel manipulation strategies, and the extended applications of these versatile substrates. © 2020 The Author(s)

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✓ **نام ژورنال:**

The Innovation

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

73

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

SERS Activity of Semiconductors: Crystalline and Amorphous Nanomaterials

✓ **نویسندگان:**

Wang X., Guo L.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) spectroscopy on semiconductors has attracted increasing attention due to its high spectral reproducibility and unique selectively to target molecules. Recently, endeavors have been made in fabricating novel SERS-active semiconductor substrates and exploring new enhancement mechanisms to improve the sensitivity of semiconductor substrates. This Minireview explains the enhancement mechanism of the semiconductor SERS effect in a brief tutorial and summarize recent developments of novel semiconductor substrates, in particular with regard to the remarkable SERS activity of amorphous semiconductor nanomaterials. Potential applications of semiconductor SERS are also a key issue of concern. We discuss a variety of promising applications of semiconductor SERS in the fields of in situ analytical chemistry, spectroelectrochemical analysis, biological sensing, and trace detection. © 2019 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim

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✓ **نام ژورنال:**

Angewandte Chemie - International Edition

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

73

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Applications of magnetic nanoparticles in surface-enhanced Raman scattering (SERS) detection of environmental pollutants

✓ **نویسندگان:**

Song D., Yang R., Long F., Zhu A.

✓ **خلاصه پژوهش:**

Environmental pollution, a major problem worldwide, poses considerable threat to human health and ecological environment. Efficient and reliable detection technologies, which focus on the appearance of emerging environmental and trace pollutants, are urgently needed. Surface-enhanced Raman scattering (SERS) has become an attractive analytical tool for sensing trace targets in environmental field because of its inherent molecular fingerprint specificity and high sensitivity. In this review, we focused on the recent developments in the integration of magnetic nanoparticles (MNPs) with SERS for facilitating sensitive detection of environmental pollutants. An overview and classification of different types of MNPs for SERS detection were initially provided, enabling us to categorize the huge amount of literature that was available in the interdisciplinary research field of MNPs based SERS technology. Then, the basic working principles and applications of MNPs in SERS detection were presented. Subsequently, the detection technologies integrating MNPs with SERS that eventually were used for the detection of various environmental pollutions were reviewed. Finally, the advantages of MNP-basedSERS detection technology for environmental pollutants were concluded, and the current challenges and future outlook of this technology in practical applications were highlighted. The application of the MNPs-basedSERS techniques for environmental analysis will be significantly advanced with the great progresses of the nanotechnologies, optics, and materials. © 2018

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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Journal of Environmental Sciences (China)

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

73

✓ **عنوان پژوهش:**

In vitro and in vivo sers biosensing for disease diagnosis

✓ **نویسندگان:**

Moore T.S., Moody A.S., Payne T.D., Sarabia G.M., Daniel A.R., Sharma B.

✓ **خلاصه پژوهش:**

For many disease states, positive outcomes are directly linked to early diagnosis, where therapeutic intervention would be most effective. Recently, trends in disease diagnosis have focused on the development of label-free sensing techniques that are sensitive to low analyte concentrations found in the physiological environment. Surface-enhanced Raman spectroscopy (SERS) is a powerful vibrational spectroscopy that allows for label-free, highly sensitive, and selective detection of analytes through the amplification of localized electric fields on the surface of a plasmonic material when excited with monochromatic light. This results in enhancement of the Raman scattering signal, which allows for the detection of low concentration analytes, giving rise to the use of SERS as a diagnostic tool for disease. Here, we present a review of recent developments in the field of in vivo and in vitro SERS biosensing for a range of disease states including neurological disease, diabetes, cardiovascular disease, cancer, and viral disease. © 2018 by the authors.

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Biosensors

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

73

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

SERS detection of arsenic in water: A review

✓ **نویسندگان:**

Hao J., Han M.-J., Han S., Meng X., Su T.-L., Wang Q.K.

✓ **خلاصه پژوهش:**

Arsenic (As) is one of the most toxic contaminants found in the environment. Development of novel detection methods for As species in water with the potential for field use has been an urgent need in recent years. In past decades, surface-enhanced Raman scattering (SERS) has gained a reputation as one of the most sensitive spectroscopic methods for chemical and biomolecular sensing. The SERS technique has emerged as an extremely promising solution for in-situ detection of arsenic species in the field, particularly when coupled with portable/handheld Raman spectrometers. In this article, the recent advances in SERS analysis of arsenic species in water media are reviewed, and the potential of this technique for fast screening and field testing of arsenic-contaminated environmental water samples is discussed. The problems that remain in the field are also discussed and an outlook for the future is featured at the end of the article. © 2015.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.jes.2015.05.013

✓ **نام ژورنال:**

Journal of Environmental Sciences (China)

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

73

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) combined techniques for high-performance detection and characterization

✓ **نویسندگان:**

Zhang Y., Zhao S., Zheng J., He L.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) is an emerging analytical technique with high speed and sensitivity, despite some shortcomings. Combined with other techniques can overcome these limitations and enhance the capability for detection and characterization with SERS, and has been successfully in many recent studies. Various SERS combined techniques are systematically summarized in this review for the first time. SERS can be combined with diverse techniques, such as chemical separation, biological capturing, colorimetry, microfluidic devices, and labeling techniques, to enhance detection capabilities. Moreover, combinations of SERS and other chemical analytical techniques such as mass spectroscopy, nuclear magnetic resonance, Infrared spectroscopy, and X-ray photoelectron spectroscopy, can enable more precise characterization. The theories and applications of these SERS combined techniques as well as their pros and cons are compared, and further perspectives are proposed. This review provides new insights into advances in SERS combined techniques and their use in real-life studies. © 2017 Elsevier B.V.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

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TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

72

✓ **عنوان پژوهش:**

Controlling the size and shape of gold nanoparticles in fulvic acid colloidal solutions and their optical characterization using SERS

✓ **نویسندگان:**

Dos Santos Jr. D.S., Alvarez-Puebla R.A., Oliveira Jr. O.N., Aroca R.F.

✓ **خلاصه پژوهش:**

The size and shape of nanoparticles can be controlled by varying the pH and concentration of the fulvic acid (FA) colloidal solution. FA thin solid films with embedded Au nanoparticles have been fabricated, and their optical field enhancing properties tested in surface-enhanced Raman scattering (SERS). High-resolution transmission electron microscopy data indicated that the size of nanoparticles ranges from 4 to 15 nm for films obtained at pH 11 and 8. At pH 5, however, hexagonal and triangular particles of ~ 50 nm and truncated triangles of ~ 200 nm are produced with a high concentration of fulvic acid (250 mg L-1). The number and size of truncated triangles can be diminished by decreasing the concentration of FA in the colloidal solution. This unprecedented control of size and shape was preserved in thin solid FA films embedding the gold nanoparticles. The plasmon-assisted enhancing optical properties are demonstrated by SERS of 2-naphthalenethiol, an analyte with a well defined SERS spectrum. © The Royal Society of Chemistry 2005.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Journal of Materials Chemistry

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

72

✓ عنوان پژوهش:

Novel SERS labels: Rational design, functional integration and biomedical applications

✓ نویسندگان:

Shan B., Pu Y., Chen Y., Liao M., Li M.

✓ خلاصه پژوهش:

Driven by the growing demand for healthcare and point-of-care test applications, next-generation diagnostic tools of diseases require sensing platforms that enable rapid, quantitative readout of analytes with excellent specificity and sensitivity. Although label-free detection permits simplicity, flexibility and high specificity, it has usually poor throughput, limited sensitivity and requires professional instrumentation. Label-based detection using optical labels overcomes many of these drawbacks and has been demonstrated to be an effective alternative for improved sensing performances. The current research focus has been directed towards innovating high-performance optical labels for ultrasensitive biosensing and disease diagnostics in place of conventional optical labels. Surface-enhanced Raman scattering (SERS) labels have proven to be excellent labels for biosensing because of their merits in many aspects, such as flexibility, less interference from biological matrices, high photostability, easy multiplex encoding, etc. These fantastic features make SERS labels particularly suitable for ultrasensitive detection of disease biomarkers in body fluids and targeted imaging of diseased cells and tissues, respectively. In this Review, we introduce the design and deployment of SERS labels for ultrasensitive detection, and summarize recent research progress in the development of SERS label-based sensing platforms and their applications in disease biomarker detection, targeted cellular imaging and spectroscopic detection of tumor lesions. First, we will discuss the design principles and comprehensive considerations of SERS labels, and the on-demand integration of functionalities. Next, we introduce the design of SERS sensing platforms on basis of SERS labels for ultrasensitive and selective detection of diverse pathology-related biomarkers, including proteins, nucleic acids, small molecules and inorganic ions. In addition, through the rational incorporation of targeting ligands on SERS labels, novel SERS probes are created for targeting near-infrared (NIR) imaging and spectroscopic detection of tumor, taking advantages of large NIR light penetration depth, high brightness, stability, etc. Our and other research efforts have demonstrated the promising potential of SERS label-based sensing platforms for detection of diverse circulating biomarkers for non-invasive disease diagnostics and deep-tissue spectroscopic detection of tumor. It is believed that this review will motivate further exploration of clinical applications of SERS labels in near future. © 2018 Elsevier B.V.

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Coordination Chemistry Reviews

✓ سال انتشار:

2018

✓ تعداد ارجاعات:

71

✓ **عنوان پژوهش:**

Nanostructured plasmonic substrates for use as SERS sensors

✓ **نویسندگان:**

Jeon T.Y., Kim D.J., Park S.-G., Kim S.-H., Kim D.-H.

✓ **خلاصه پژوهش:**

Plasmonic nanostructures strongly localize electric fields on their surfaces via the collective oscillations of conducting electrons under stimulation by incident light at a certain wavelength. Molecules adsorbed onto the surfaces of plasmonic structures experience a strongly enhanced electric field due to the localized surface plasmon resonance (LSPR), which amplifies the Raman scattering signal obtained from these adsorbed molecules. This phenomenon is referred to as surface-enhanced Raman scattering (SERS). Because Raman spectra serve as molecular fingerprints, SERS has been intensively studied for its ability to facilely detect molecules and provide a chemical analysis of a solution. Further enhancements in the Raman intensity and therefore higher sensitivity in SERS-based molecular analysis have been achieved by designing plasmonic nanostructures with a controlled size, shape, composition, and arrangement. This review paper focuses on the current state of the art in the fabrication of SERS-active substrates and their use as chemical and biosensors. Starting with a brief description of the basic principles underlying LSPR and SERS, we discuss three distinct nanofabrication methods, including the bottom-up assembly of nanoparticles, top-down nanolithography, and lithography-free random nanoarray formation. Finally, typical applications of SERS-based sensors are discussed, along with their perspectives and challenges.
© 2016 The Author(s).

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✓ **نام ژورنال:**

Nano Convergence

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

71

✓ **عنوان پژوهش:**

The electromagnetic effect in surface enhanced Raman scattering: Enhancement optimization using precisely controlled nanostructures

✓ **نویسندگان:**

Guillot N., de la Chapelle M.L.

✓ **خلاصه پژوهش:**

This article presents an overview of surface enhanced Raman scattering (SERS) studies using substrates realized with fabrication techniques that provide a precise control of the geometry of metallic nanostructures. The role of the localized surface plasmons resonance (LSPR) in SERS is especially emphasized since it can be studied systematically thanks to the substrates produced by these fabrication techniques. We therefore explain why a precise control of the LSPR position is important in order to optimize the SERS intensity. The leading fabrication techniques (self-assembly and nanolithography) that ensure a precise control of all the geometrical parameters of the fabricated nanostructures and, as a consequence, a precise control of the LSPR are then described. The largest part of this article is focused on the identification of the main parameters governing the SERS intensity through the LSPR position such as nanoparticle size and shape (principally cylindrical, triangular, square, and elongated sections), higher orders LSPR, excitation polarization and excitation wavelength. The studies done on the optimization of the SERS intensity in the last 10 years is then summarized. We finally describe the studies made on the near-field coupling between the nanoparticles and emphasize its potential before exploring other kind of controlled nanostructures used to increase the SERS intensity. © 2012 Elsevier Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Journal of Quantitative Spectroscopy and Radiative Transfer

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

71

✓ **عنوان پژوهش:**

Review on SERS of bacteria

✓ **نویسندگان:**

Mosier-Boss P.A.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) has been widely used for chemical detection. Moreover, the inherent richness of the spectral data has made SERS attractive for use in detecting biological materials, including bacteria. This review discusses methods that have been used to obtain SERS spectra of bacteria. The kinds of SERS substrates employed to obtain SERS spectra are discussed as well as how bacteria interact with silver and gold nanoparticles. The roll of capping agents on Ag/Au NPs in obtaining SERS spectra is examined as well as the interpretation of the spectral data. © 2017 by the authors.

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✓ **نام ژورنال:**

Biosensors

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

70

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

A critical review of flexible and porous SERS sensors for analytical chemistry at the point-of-sample

✓ **نویسندگان:**

Restaino S.M., White I.M.

✓ **خلاصه پژوهش:**

For decades surface enhanced Raman spectroscopy (SERS) has been intensely investigated as a possible solution for performing analytical chemistry at the point of sample origin. Unfortunately, due to cost and usability constraints, conventional rigid SERS sensors and microfluidic SERS sensors have yet to make a significant impact outside of the realm of academics. However, the recently introduced flexible and porous paper-based SERS sensors are proving to be widely adaptable to realistic usage cases in the field. In contrast to rigid and microfluidic SERS sensors, paper SERS sensors feature (i) the potential for roll-to-roll manufacturing methods that enable low sensor cost, (ii) simple sample collection directly onto the sensor via swabbing or dipping, and (iii) equipment-free separations for sample cleanup. In this review we argue that movement to paper-based SERS sensors will finally enable point-of-sample analytical chemistry applications. In addition, we present and compare the numerous fabrication techniques for paper SERS sensors and we describe various sample collection and sample clean-up capabilities of paper SERS sensors, with a focus on how these features enable practical applications in the field. Finally, we present our expectations for the future, including emerging ideas inspired by paper SERS. © 2018 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Analytica Chimica Acta

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

69

✓ **عنوان پژوهش:**

Plasmonic Metasurfaces for Nonlinear Optics and Quantitative SERS

✓ **نویسندگان:**

Gwo S., Wang C.-Y., Chen H.-Y., Lin M.-H., Sun L., Li X., Chen W.-L., Chang Y.-M., Ahn H.

✓ **خلاصه پژوهش:**

Plasmonic metasurfaces consist of two-dimensional arrays of metallic nanoresonators (plasmonic "meta-atoms"), which exhibit collective and tunable resonance properties controlled by electromagnetic near-field coupling. These man-made surfaces can produce a range of unique optical properties unattainable with natural materials. In this review, we focus on the emerging applications of metasurfaces with precisely engineered plasmonic properties for nonlinear optics and surface-enhanced Raman spectroscopy (SERS). In practice, these applications are quite susceptible to material losses and structural imperfections, such as variations in size, shape, periodicity of meta-atoms, and their material states (crystallinity, impurity, and oxidation, etc.). In these aspects, conventional top-down lithographic techniques are facing major challenges due to inherent limitations in intrinsic material properties and material quality introduced during growth, synthesis, and fabrication processes, as well as achievable lithographic resolution. Moreover, they are prohibitively expensive and time-consuming for fabrication over large areas. Here, we show that colloidal silver crystals (millimeter-sized single-crystalline plates and thiolate-capped nanoparticles) synthesized by solution-based chemical methods are excellent material platforms for the fabrication of high-quality plasmonic metasurfaces. In particular, both top-down (focused ion-beam milling) and bottom-up (centimeter-scale self-assembly) techniques can be exploited to generate uniform and precisely engineered colloidal metasurfaces for broadband tunable (across the full visible range) second-harmonic generation and quantitative SERS at the single-molecule level. © 2016 American Chemical Society.

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✓ **نام ژورنال:**

ACS Photonics

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

69

✓ **عنوان پژوهش:**

Recent advances in nanofabrication techniques for SERS substrates and their applications in food safety analysis

✓ **نویسندگان:**

Xie X., Pu H., Sun D.-W.

✓ **خلاصه پژوهش:**

The ability to analyze food safety and quality in a quick, sensitive, and reliable manner is of high importance in food industry. Surface-enhanced Raman scattering (SERS), which is popular for its significant enhancement, excellent sensitivity, and the fingerprinting ability to identify special molecules, has shown vast potential for rapid detection of chemical constitutes, chemical contaminants, and pathogens in food sample. For SERS, the enhancement of Raman signals is related to not only the SERS-active substrates, but also the interactions between sample and substrates. In the current review, colloidal and solid surface-based substrates are briefly described, fabrication techniques for SERS substrates are presented, and applications of SERS for food matrixes, correlation between substrates and food samples are also introduced. Finally, some outlook on further developments is presented. The current review is therefore intended to provide a comprehensive overview on the nanofabrication of SERS substrates, and the potential of applying SERS as an important food analysis platform. © 2017, © 2017 Taylor & Francis Group, LLC.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

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✓ **نام ژورنال:**

Critical Reviews in Food Science and Nutrition

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

68

✓ **عنوان پژوهش:**

Rationally designed multifunctional plasmonic nanostructures for surface-enhanced Raman spectroscopy: A review

✓ **نویسندگان:**

Xie W., Schlücker S.

✓ **خلاصه پژوهش:**

Rationally designed multifunctional plasmonic nanostructures efficiently integrate two or more functionalities into a single entity, for example, with both plasmonic and catalytic activity. This review article is focused on their synthesis and use in surface-enhanced Raman scattering (SERS) as a molecular spectroscopic technique with high sensitivity, fingerprint specificity, and surface selectivity. After a short tutorial on the fundamentals of Raman scattering and SERS in particular, applications ranging from chemistry (heterogeneous catalysis) to biology and medicine (diagnostics/imaging, therapy) are summarized. © 2014 IOP Publishing Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Reports on Progress in Physics

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

68

TEKSAN
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✓ **عنوان پژوهش:**

Detection of foodborne pathogens by surface enhanced Raman spectroscopy

✓ **نویسندگان:**

Zhao X., Li M., Xu Z.

✓ **خلاصه پژوهش:**

Food safety has become an important public health issue in both developed and developing countries. However, as the foodborne illnesses caused by the pollution of foodborne pathogens occurred frequently, which seriously endangered the safety and health of human beings. More importantly, the traditional techniques, such as PCR and enzyme-linked immunosorbent assay, are accurate and effective, but their pretreatments are complex and time-consuming. Therefore, how to detect foodborne pathogens quickly and sensitively has become the key to control food safety. Because of its sensitivity, rapidity, and non-destructive damage to the sample, the surface enhanced Raman scattering (SERS) is considered to be a powerful testing technology that is widely used to different fields. This review aims to give a systematic and comprehensive understanding of SERS for rapid detection of pathogen bacteria. First, the related concepts of SERS are stated, such as its work principal, active substrate, and biochemical origins of the detection of bacteria by SERS. Then the latest progress and applications in food safety, from detection and characterization of targets in label-free method to label method, is summarized. The advantages and limitations of different SERS substrates and methods are discussed. Finally, there are still several hurdles for the further development of SERS techniques into real-world applications. This review comes up with the perspectives on the future trends of the SERS technique in the field of foodborne pathogens detection and some problems to be solved urgently. Therefore, the purpose is mainly to understand the detection of foodborne pathogens and to make further emphasis on the importance of SERS techniques. © 2018 Zhao, Li and Xu.

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✓ **نام ژورنال:**

Frontiers in Microbiology

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

67

✓ **عنوان پژوهش:**

Plasmonic SERS biosensing nanochips for DNA detection

✓ **نویسندگان:**

Ngo H.T., Wang H.-N., Fales A.M., Vo-Dinh T.

✓ **خلاصه پژوهش:**

The development of rapid, cost-effective DNA detection methods for molecular diagnostics at the point-of-care (POC) has been receiving increasing interest. This article reviews several DNA detection techniques based on plasmonic-active nanochip platforms developed in our laboratory over the last 5 years, including the molecular sentinel-on-chip (MSC), the multiplex MSC, and the inverse molecular sentinel-on-chip (iMS-on-Chip). DNA probes were used as the recognition elements, and surface-enhanced Raman scattering (SERS) was used as the signal detection method. Sensing mechanisms were based on hybridization of target sequences and DNA probes, resulting in a distance change between SERS reporters and the nanochip's plasmonic-active surface. As the field intensity of the surface plasmon decays exponentially as a function of distance, the distance change in turn affects SERS signal intensity, thus indicating the presence and capture of the target sequences. Our techniques were single-step DNA detection techniques. Target sequences were detected by simple delivery of sample solutions onto DNA probe-functionalized nanochips and measuring the SERS signal after appropriate incubation times. Target sequence labeling or washing to remove unreacted components was not required, making the techniques simple, easy-to-use, and cost-effective. The usefulness of the nanochip platform-based techniques for medical diagnostics was illustrated by the detection of host genetic biomarkers for respiratory viral infection and of the dengue virus gene. © 2015, Springer-Verlag Berlin Heidelberg.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Analytical and Bioanalytical Chemistry

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

67

✓ **عنوان پژوهش:**

Signaling mechanisms of the Mycobacterium tuberculosis receptor Ser/Thr protein kinases

✓ **نویسندگان:**

Alber T.

✓ **خلاصه پژوهش:**

Like eukaryotes, bacteria express receptor Ser/Thr protein kinases (STPKs) that initiate a wide variety of signaling networks. Recent biochemical and structural studies of the STPKs of Mycobacterium tuberculosis have revealed that bacterial and eukaryotic STPKs adopt common folds and share mechanisms of substrate recognition and regulation. Mycobacterial receptor STPKs are activated by dimerization through two distinct interfaces that promote activation-loop phosphorylation. The active STPKs phosphorylate diverse substrates within the bacterial cell, including other kinases as well as proteins involved in many central physiological processes. In the case of the FHA-domain protein, GarA, the unphosphorylated protein regulates primary metabolism, while phosphorylation mediates GarA autoinhibition. These studies have begun to define the activation mechanisms and the biological regulatory functions of the mycobacterial STPKs. © 2009 Elsevier Ltd. All rights reserved.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Current Opinion in Structural Biology

✓ **سال انتشار:**

2009

✓ **تعداد ارجاعات:**

67

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopic detection of molecular chemo- and plasmo-catalysis on noble metal nanoparticles

✓ **نویسندگان:**

Xie W., Schlücker S.

✓ **خلاصه پژوهش:**

The in situ detection of reactions catalyzed by metal NPs is challenging because the underlying chemical transformations occur at interfaces. Surface-enhanced Raman scattering (SERS), a surface-selective, sensitive and label-free vibrational spectroscopic technique, is ideally suited for monitoring of heterogeneous catalysis with high chemical specificity. A major limitation in the past, however, was that small, catalytically active metal NPs do not exhibit the high plasmonic activity required for SERS. This feature article focuses on the design, synthesis and use of bifunctional NPs with both catalytic and plasmonic activity for in situ SERS detection of reactions catalyzed by metal NPs. We focus on model reactions induced by chemical reducing agents such as hydride or molecular hydrogen as well as on plasmon-induced photo-catalysis including both photo-oxidation and photo-reduction. Finally, we highlight the concept of photo-recycling on halide-containing silver surfaces for unprecedented multi-electron reduction chemistry. © 2018 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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Chemical Communications

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

66

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

SERS Tags: The Next Promising Tool for Personalized Cancer Detection?

✓ **نویسندگان:**

Fabris L.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has been historically considered a tool for physical scientists. Recently, however, a new avenue has opened for the application of SERS in the medical field, mainly spurred by the implementation of SERS tags. SERS tags are employed for the indirect identification of target molecules, similarly to what fluorescent dyes do, but with several intrinsic advantages. They have proven very useful in in vivo, ex vivo, and in vitro identification of cancerous cells and tissues, with targeting selectivity that can be tuned to recognize individual markers. It has also been demonstrated for the first time that surgical outcomes may be improved via the use of SERS tags, leading to complete tumor resection. Herein, I will explain how SERS tags can aid in the identification of cancerous tissues at the single cell level and how they promise to render SERS a powerful tool for personalized cancer detection. © 2016 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/cnma.201500221

✓ **نام ژورنال:**

ChemNanoMat

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

66

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Nanoprobes for intracellular and single cell surface-enhanced Raman spectroscopy (SERS)

✓ **نویسندگان:**

Vitol E.A., Orynbayeva Z., Friedman G., Gogotsi Y.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectroscopy (SERS) is a promising and powerful label free technique for high resolution analysis of single cells. For intracellular analysis, there is a need for SERS-active nanoprobes that are minimally invasive to cells, do not affect cell viability, and provide reproducible signals. This work reviews the state-of-the-art tools currently available for intracellular SERS. Various types of SERS probes are considered, including colloidal gold and silver nanoparticles, metallized optical fibers, and tip-enhanced Raman probes. We also discuss recently developed SERS-active nanopipettes implemented on the basis of pulled glass microcapillaries. Finally, the critical aspects of selecting an optimal SERS nanoprobe for single-cell analysis depending on a particular application are summarized. Copyright © 2012 John Wiley & Sons, Ltd.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1002/jrs.3100

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

66

TEKSAN
Detect Precisely

✓ عنوان پژوهش:

A review of cellulose-based substrates for SERS: fundamentals, design principles, applications

✓ نویسندگان:

Ogundare S.A., van Zyl W.E.

✓ خلاصه پژوهش:

Abstract: Surface enhanced Raman spectroscopy (SERS) provides a useful sensory platform whereby target molecules at low concentration are identified, potentially detecting a single molecule. As a result, SERS has been widely applied in a variety of research endeavors using different substrates, one of which is a cellulose-based substrate. The unique properties of cellulose in its various forms make it an important component in the design of a SERS substrate. Being a flexible substrate with minimal SERS signal interference, paper-based cellulose templates are the most extensively explored form of cellulose in SERS substrate design, with innovative designs and applications. This review provides an overview of the fundamental tools of SERS enhancement, followed by a comprehensive appraisal of the various design principles associated with producing cellulose-based materials and their use as SERS substrates. Though cellulose in its various forms cannot provide the localized surface plasmon resonance required in SERS, it aids in aggregation and stabilization of plasmonic nanoparticles leading to “hot spots” for SERS signal enhancement. The unconventional techniques adopted in the designs are examined and the associated challenges are highlighted. The review demonstrates SERS applications of the substrates in diverse technologies such as bioanalysis, water quality assessment, food safety, adulteration of illicit drugs and dye identification in artworks. Ultimately, we envisage the need for a universal set standard to realize the ideal of designing SERS substrates from the perspective of end-user demand. This can be achieved through a re-evaluation of existing findings on cellulose-based SERS substrates. Graphic abstract: [Figure not available: see fulltext.] © 2019, Springer Nature B.V.

✓ لینک DOI (استفاده برای دانلود مقاله)

10.1007/s10570-019-02580-0

✓ نام ژورنال:

Cellulose

✓ سال انتشار:

2019

✓ تعداد ارجاعات:

65

✓ **عنوان پژوهش:**

Plasmonic substrates for surface enhanced Raman scattering

✓ **نویسندگان:**

Li W., Zhao X., Yi Z., Glushenkov A.M., Kong L.

✓ **خلاصه پژوهش:**

As an advanced analytical tool, surface-enhanced Raman scattering (SERS) has broad applications in identification of colorants in paints and glazes, hazard detection to ensure food safety, biomedicine and diagnosis, environmental monitoring, detection of explosives and forensic science. In this review, main types of plasmonic substrates, which include solid substrate with metallic nanostructures and chemically synthesized noble metal colloids, and their fabrication methods are reviewed. The design principles for fabrication of ultrasensitive plasmonic substrates for SERS are presented on the basis of published literature. Finally, various applications of SERS substrates are described, indicating the potential of this technique in practical applications. As an ultrasensitive detection method, SERS is at the core of a rapidly expanding research field. © 2017 Elsevier B.V.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1016/j.aca.2017.06.002

✓ **نام ژورنال:**

Analytica Chimica Acta

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

65

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy: A new modality for cancer imaging

✓ **نویسندگان:**

Andreou C., Kishore S.A., Kircher M.F.

✓ **خلاصه پژوهش:**

Although surface-enhanced Raman scattering (SERS) spectroscopy has traditionally been used as an in vitro analytic tool, in the past few years the first reports of the feasibility of in vivo imaging of cancer with biocompatible SERS probes have emerged. SERS imaging has great potential in the field of medical imaging because it offers several major advantages over other molecular imaging methods. Medical imaging using SERS nanoprobes can yield higher sensitivity and higher signal specificity than other imaging modalities, while also offering multiplexing capabilities that allow for unique applications. This article reviews the principles of SERS and highlights recent advances for in vivo cancer imaging. To present the abilities of this method as accurately as possible, the discussion is limited to studies in which the imaging data were confirmed by histological correlation. COPYRIGHT © 2015 by the Society of Nuclear Medicine and Molecular Imaging, Inc.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.2967/jnumed.115.158196

✓ **نام ژورنال:**

Journal of Nuclear Medicine

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

65

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Nanoparticle SERS substrates with 3D Raman-active volumes

✓ **نویسندگان:**

Stoerzinger K.A., Lin J.Y., Odom T.W.

✓ **خلاصه پژوهش:**

This Perspective reviews a new class of surface-enhanced Raman scattering (SERS) nanoparticle substrates defined by their three-dimensional (3D) confinement of localized electromagnetic fields. First, we describe the critical design parameters and recent advances in nanofabrication to create reproducible nanoparticle assemblies for SERS. Next, we highlight a promising platform - gold nanopyramids - for testing how the local arrangement of particles in an assembly affects the overall SERS response. The dimensions and optical properties of the nanopyramids can be tuned easily, and their unique anisotropic shape allows them to be organized into different particle configurations with 3D Raman-active volumes. Because of their large hot-spot volumes, this unique class of nanoparticle substrates offers an attractive alternative for ultra-sensitive sensors and trace chemical analysis. © The Royal Society of Chemistry 2011.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c1sc00125f

✓ **نام ژورنال:**

Chemical Science

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

65

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Review of microfluidic approaches for surface-enhanced Raman scattering

✓ **نویسندگان:**

Zhou Q., Kim T.

✓ **خلاصه پژوهش:**

The development of lab-on-a-chip (LoC) systems has allowed for the successful combination of many detection methods with these systems. Surface-enhanced Raman spectroscopy (SERS) has the potential for use in rapid trace-level biological and environmental analysis because of its high sensitivity, rapid response, and fingerprint effect. With the development of nanotechnology, various active SERS substrates have been fabricated. By combining well-designed microchannels and SERS substrates, more effective and convenient SERS detecting systems have been realized. Furthermore, novel functions that were conventionally deemed impossible for normal SERS substrates have been achieved. © 2015 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.snb.2015.12.069

✓ **نام ژورنال:**

Sensors and Actuators, B: Chemical

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

64

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Recent progress in detection of mercury using surface enhanced Raman spectroscopy - A review

✓ **نویسندگان:**

Sun Z., Du J., Jing C.

✓ **خلاصه پژوهش:**

Concerns over exposure to mercury have motivated the exploration of cost-effective, rapid, and reliable method for monitoring Hg2+ in the environment. Recently, surface-enhanced Raman scattering (SERS) has become a promising alternative method for Hg2+ analysis. SERS is a spectroscopic technique which combines modern laser spectroscopy with the optical properties of nano-sized noble metal structures, resulting in substantially increased Raman signals. When Hg2+ is in a close contact with metallic nanostructures, the SERS effect provides unique structural information together with ultrasensitive detection limits. This review introduces the principles and contemporary approaches of SERS-based Hg2+ detection. In addition, the perspective and challenges are briefly discussed. © 2015 The Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1016/j.jes.2015.11.009

✓ **نام ژورنال:**

Journal of Environmental Sciences (China)

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

64

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Single-fibre surface-enhanced Raman sensors with angled tips

✓ **نویسندگان:**

Viets C., Hill W.

✓ **خلاصه پژوهش:**

Single-fibre surface-enhanced Raman sensors were prepared by depositing rough metal films at the tips of optical fibres. Different deposition techniques such as slow evaporation of metal island films and vacuum deposition of metal films over nanoparticles or on pre-roughened surfaces were applied and compared. The superposition of surface Raman spectra from the tips with Raman spectra of the fibre core made maximum enhancements necessary for the construction of long fibre sensors. The enhancement was improved significantly by altering the tip geometry. Angled polishing has enhanced the SERS intensity by up to a factor of 6. The intensity increases monotonically with increase in the angle, reaching its maximum value at the largest prepared angle of 40°. Copyright (C) 2000 John Wiley and Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/1097-4555(200007)31:7<625::AID-JRS589>3.0.CO;2-T

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2000

✓ **تعداد ارجاعات:**

64

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Nanostructure-based surface-enhanced Raman scattering biosensors for nucleic acids and proteins

✓ **نویسندگان:**

Chao J., Cao W., Su S., Weng L., Song S., Fan C., Wang L.

✓ **خلاصه پژوهش:**

Detection of nucleic acid and protein targets related to human health and safety has attracted widespread attention. Surface-enhanced Raman scattering (SERS) is a powerful tool for biomarker detection because of its ultrahigh detection sensitivity and unique fingerprinting spectra. In this review, we first introduce the development of nanostructure-based SERS-active substrates and SERS nanotags, which greatly influence the performance of SERS biosensors. We then focus on recent advances in SERS biosensors for DNA, microRNA and protein determination, including label-free, labeled and multiplex analyses as well as in vivo imaging. Finally, the prospects and challenges of such nanostructure-based SERS biosensors are discussed. © The Royal Society of Chemistry 2016.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c5tb02135a

✓ **نام ژورنال:**

Journal of Materials Chemistry B

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

63

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Optofluidic SERS: Synergizing photonics and microfluidics for chemical and biological analysis

✓ **نویسندگان:**

White I.M., Yazdi S.H., Yu W.W.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) leverages the specificity of Raman scattering and the sensitivity provided by localized plasmonic effects for applications in chemical and biomolecular detection. However, nearly four decades after the first report of SERS, practical uses of the technique remain limited. Optofluidic SERS-the synergistic use of microfluidics to improve the performance of SERS-may finally lead to practical devices for chemical and biomolecular detection. In this review, we describe recent advances in optofluidic SERS microsystems that have been developed to improve the performance and applicability of SERS. These techniques include designs that improve the light-analyte interaction, that perform active or passive concentration of metal nanoparticles and/or analyte molecules, and that utilize microfluidic techniques to improve functionality. In addition, we present optofluidic SERS techniques that enable new applications that have not been possible before the advent of optofluidics. Finally, we project future advances in optofluidic SERS and present a vision for the disruptive technologies that will enable the translation of SERS from the research lab to practical uses. © Springer-Verlag 2012.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s10404-012-0962-2

✓ **نام ژورنال:**

Microfluidics and Nanofluidics

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

63

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Nanoparticles and intracellular applications of surface-enhanced Raman spectroscopy

✓ **نویسندگان:**

Taylor J., Huefner A., Li L., Wingfield J., Mahajan S.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman spectrocopy (SERS) offers ultrasensitive vibrational fingerprinting at the nanoscale. Its non-destructive nature affords an ideal tool for interrogation of the intracellular environment, detecting the localisation of biomolecules, delivery and monitoring of therapeutics and for characterisation of complex cellular processes at the molecular level. Innovations in nanotechnology have produced a wide selection of novel, purpose-built plasmonic nanostructures capable of high SERS enhancement for intracellular probing while microfluidic technologies are being utilised to reproducibly synthesise nanoparticle (NP) probes at large scale and in high throughput. Sophisticated multivariate analysis techniques unlock the wealth of previously unattainable biomolecular information contained within large and multidimensional SERS datasets. Thus, with suitable combination of experimental techniques and analytics, SERS boasts enormous potential for cell based assays and to expand our understanding of the intracellular environment. In this review we trace the pathway to utilisation of nanomaterials for intracellular SERS. Thus we review and assess nanoparticle synthesis methods, their toxicity and cell interactions before presenting significant developments in intracellular SERS methodologies and how identified challenges can be addressed. © 2016 The Royal Society of Chemistry.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/c6an01003b

✓ **نام ژورنال:**

Analyst

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

62

✓ **عنوان پژوهش:**

Diversity in domain architectures of Ser/Thr kinases and their homologues in prokaryotes

✓ **نویسندگان:**

Krupa A., Srinivasan N.

✓ **خلاصه پژوهش:**

Background: Ser/Thr/Tyr kinases (STYKs) commonly found in eukaryotes have been recently reported in many bacterial species. Recent studies elucidating their cellular functions have established their roles in bacterial growth and development. However functions of a large number of bacterial STYKs still remain elusive. The organisation of domains in a large dataset of bacterial STYKs has been investigated here in order to recognise variety in domain combinations which determine functions of bacterial STYKs. Results: Using sensitive sequence and profile search methods, domain organisation of over 600 STYKs from 125 prokaryotic genomes have been examined. Kinase catalytic domains of STYKs tethered to a wide range of enzymatic domains such as phosphatases, HSP70, peptidyl prolyl isomerases, pectin esterases and glycoproteases have been identified. Such distinct preferences for domain combinations are not known to be present in either the Histidine kinase or the eukaryotic STYK families. Domain organisation of STYKs specific to certain groups of bacteria has also been noted in the current analysis. For example, Hydrophobin like domains in Mycobacterial STYK and penicillin binding domains in few STYKs of Gram-positive organisms and FHA domains in cyanobacterial STYKs. Homologues of characterised substrates of prokaryotic STYKs have also been identified. Conclusions: The domains and domain architectures of most of the bacterial STYKs identified are very different from the known domain organisation in STYKs of eukaryotes. This observation highlights distinct biological roles of bacterial STYKs compared to eukaryotic STYKs. Bacterial STYKs reveal high diversity in domain organisation. Some of the modular organisations conserved across diverse bacterial species suggests their central role in bacterial physiology. Unique domain architectures of few other groups of STYKs reveal recruitment of functions specific to the species. © 2005 Krupa and Srinivasan, licensee BioMed Central Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1186/1471-2164-6-129

✓ **نام ژورنال:**

BMC Genomics

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

62

✓ **عنوان پژوهش:**

Facing Challenges in Real-Life Application of Surface-Enhanced Raman Scattering: Design and Nanofabrication of Surface-Enhanced Raman Scattering Substrates for Rapid Field Test of Food Contaminants

✓ **نویسندگان:**

Shi R., Liu X., Ying Y.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) is capable of detecting a single molecule with high specificity and has become a promising technique for rapid chemical analysis of agricultural products and foods. With a deeper understanding of the SERS effect and advances in nanofabrication technology, SERS is now on the edge of going out of the laboratory and becoming a sophisticated analytical tool to fulfill various real-world tasks. This review focuses on the challenges that SERS has met in this progress, such as how to obtain a reliable SERS signal, improve the sensitivity and specificity in a complex sample matrix, develop simple and user-friendly practical sensing approach, reduce the running cost, etc. This review highlights the new thoughts on design and nanofabrication of SERS-active substrates for solving these challenges and introduces the recent advances of SERS applications in this area. We hope that our discussion will encourage more researches to address these challenges and eventually help to bring SERS technology out of the laboratory. © Copyright 2017 American Chemical Society.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1021/acs.jafc.7b03075

✓ **نام ژورنال:**

Journal of Agricultural and Food Chemistry

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

61

✓ **عنوان پژوهش:**

Fundamental studies on enhancement and blinking mechanism of surface-enhanced Raman scattering (SERS) and basic applications of SERS biological sensing

✓ **نویسندگان:**

Yamamoto Y.S., Ishikawa M., Ozaki Y., Itoh T.

✓ **خلاصه پژوهش:**

We review recent our results in the fundamental study of surface-enhanced Raman scattering (SERS) with emphasis on experiments that attempted to identify the enhancement and blinking mechanism using single Ag nanoparticle dimers attached to dye molecules. These results are quantitatively discussed in the framework of electromagnetic mechanism. We also review recent our results in basic SERS applications for biological sensing regarding detections of cell surface molecules and distinction of disease marker molecules under single cell and single molecule level. © 2014 Higher Education Press and Springer-Verlag Berlin Heidelberg.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1007/s11467-013-0347-3

✓ **نام ژورنال:**

Frontiers of Physics

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

61

Detect Precisely

✓ **عنوان پژوهش:**

Surface enhanced Raman spectroscopy (SERS): Potential applications for disease detection and treatment

✓ **نویسندگان:**

McAughtrie S., Faulds K., Graham D.

✓ **خلاصه پژوهش:**

The implementation of Raman and surface enhanced Raman spectroscopy (SERS) for the detection of disease has increased in recent years. The reasons for their increased implementation have often been attributed to their well-known advantages, including the production of narrow spectral bands, which are characteristic of the molecular components present, their non-destructive method of analysis and the sensitivity and specificity which they can confer. This review analyses a range of diseases which can be detected by Raman or SERS, particularly those in vitro, ex vivo and in vivo. The sophistication of the investigated systems varied widely but the suitability of Raman and SERS for medical diagnostics and future implementation in a clinical environment is clearly demonstrated. © 2014 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1016/j.jphotochemrev.2014.09.002

✓ **نام ژورنال:**

Journal of Photochemistry and Photobiology C: Photochemistry Reviews

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

60

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Bioanalytical application of surface- and tip-enhanced Raman spectroscopy

✓ **نویسندگان:**

Pahlow S., März A., Seise B., Hartmann K., Freitag I., Kämmer E., Böhme R., Deckert V., Weber K., Cialla D., Popp J.

✓ **خلاصه پژوهش:**

Due to its fingerprint specificity and trace-level sensitivity, surface-enhanced Raman spectroscopy (SERS) is an attractive tool in bioanalytics. This review reflects the research in this highly interesting topic of the last 3-4 years. The detection of the SERS signature of biomolecules up to microorganisms and cells is introduced. Labeling using modified nanoparticles (SERS tags) is also introduced. In order to establish biomedical applications, SERS analysis is performed in complex matrices such as body fluids. Furthermore, the SERS technique is combined with other methods such as microfluidic devices for online monitoring and scanning probe microscopy (i.e. tip-enhanced Raman spectroscopy, TERS) to investigate nanoscaled features. The present review illustrates the broad application fields of SERS and TERS in bioanalytics and shows the great potential of these methods for biomedical diagnostics. © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/elsc.201100056

✓ **نام ژورنال:**

Engineering in Life Sciences

✓ **سال انتشار:**

2012

✓ **تعداد ارجاعات:**

60

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

DNA detection by surface enhanced resonance Raman scattering (SERRS)

✓ **نویسندگان:**

Faulds K., Smith W.E., Graham D.

✓ **خلاصه پژوهش:**

This Education article outlines the different ways in which surface enhanced resonance Raman scattering (SERRS) can be used for the detection of DNA. The use of various different SERRS detection strategies that have allowed both sensitive and selective detection to be obtained is covered. Detection of DNA by SERRS involves the use of a dye with the DNA, whether as an intercalator or by direct covalent attachment. This generates strong SERRS signals that indicate the presence of the specific DNA sequence. The SERRS detection of DNA in different molecular biological assays is also discussed. © The Royal Society of Chemistry 2005.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1039/b500248f

✓ **نام ژورنال:**

Analyst

✓ **سال انتشار:**

2005

✓ **تعداد ارجاعات:**

60

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Engineering State-of-the-Art Plasmonic Nanomaterials for SERS-Based Clinical Liquid Biopsy Applications

✓ **نویسندگان:**

Wang J., Koo K.M., Wang Y., Trau M.

✓ **خلاصه پژوهش:**

Precision oncology, defined as the use of the molecular understanding of cancer to implement personalized patient treatment, is currently at the heart of revolutionizing oncology practice. Due to the need for repeated molecular tumor analyses in facilitating precision oncology, liquid biopsies, which involve the detection of noninvasive cancer biomarkers in circulation, may be a critical key. Yet, existing liquid biopsy analysis technologies are still undergoing an evolution to address the challenges of analyzing trace quantities of circulating tumor biomarkers reliably and cost effectively. Consequently, the recent emergence of cutting-edge plasmonic nanomaterials represents a paradigm shift in harnessing the unique merits of surface-enhanced Raman scattering (SERS) biosensing platforms for clinical liquid biopsy applications. Herein, an expansive review on the design/synthesis of a new generation of diverse plasmonic nanomaterials, and an updated evaluation of their demonstrated SERS-based uses in liquid biopsies, such as circulating tumor cells, tumor-derived extracellular vesicles, as well as circulating cancer proteins, and tumor nucleic acids is presented. Existing challenges impeding the clinical translation of plasmonic nanomaterials for SERS-based liquid biopsy applications are also identified, and outlooks and insights into advancing this rapidly growing field for practical patient use are provided. © 2019 The Authors. Published by WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/advs.201900730

✓ **نام ژورنال:**

Advanced Science

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

59

✓ **عنوان پژوهش:**

Potential of Surface Enhanced Raman Spectroscopy (SERS) in Therapeutic Drug Monitoring (TDM). A critical review

✓ **نویسندگان:**

Jaworska A., Fornasaro S., Sergo V., Bonifacio A.

✓ **خلاصه پژوهش:**

Surface-Enhanced Raman Spectroscopy (SERS) is a label-free technique that enables quick monitoring of substances at low concentrations in biological matrices. These advantages make it an attractive tool for the development of point-of-care tests suitable for Therapeutic Drug Monitoring (TDM) of drugs with a narrow therapeutic window, such as chemotherapeutic drugs, immunosuppressants, and various anticonvulsants. In this article, the current applications of SERS in the field of TDM for cancer therapy are discussed in detail and illustrated according to the different strategies and substrates. In particular, future perspectives are provided and special concerns regarding the standardization of self-assembly methods and nanofabrication procedures, quality assurance, and technology readiness are critically evaluated. © 2016 by the authors.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.3390/bios6030047

✓ **نام ژورنال:**

Biosensors

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

59

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Silicon nanohybrid-based surface-enhanced raman scattering sensors

✓ **نویسندگان:**

Wang H., Jiang X., Lee S.-T., He Y.

✓ **خلاصه پژوهش:**

Nanomaterial-based surface-enhanced Raman scattering (SERS) sensors are highly promising analytical tools, capable of ultrasensitive, multiplex, and nondestructive detection of chemical and biological species. Extensive efforts have been made to design various silicon nanohybrid-based SERS substrates such as gold/silver nanoparticle (NP)-decorated silicon nanowires, Au/Ag NP-decorated silicon wafers (AuNP@ Si), and so forth. In comparison to free AuNP-and AgNPbased SERS sensors, the silicon nanohybrid-based SERS sensors feature higher enhancement factors (EFs) and excellent reproducibility, since SERS hot spots are effi ciently coupled and stabilized through interconnection to the semiconducting silicon substrates. Consequently, in the past decade, giant advancements in the development of silicon nanohybridbased SERS sensors have been witnessed for myriad sensing applications. In this review, the representative achievements related to the design of high-performance silicon nanohybridbased SERS sensors and their use for chemical and biological analysis are reviewed in a detailed way. Furthermore, the major opportunities and challenges in this fi eld are discussed from a broad perspective and possible future directions. © 2014 Wiley-VCH Verlag GmbH &Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/smll.201401563

✓ **نام ژورنال:**

Small

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

59

✓ **عنوان پژوهش:**

Gold-based SERS tags for biomedical imaging

✓ **نویسندگان:**

Fabris L.

✓ **خلاصه پژوهش:**

The use of SERS tags in biomedical imaging is described. SERS tags are a novel entity that has recently emerged in the SERS community, mainly spurred by the necessity of carrying out experiments in the biomedical and clinical fields, where the heterogeneity and constant evolution of the environment hamper the application of direct SERS sensing concepts. Direct sensing would in fact require the use of nanoparticles with bare metallic surfaces to allow for intense signal responses; however, the high salt contents typical of physiological conditions and issues such as fouling lead the nanoparticles to aggregate and precipitate out of solution, thus limiting reproducibility and quantitative target identification. As a consequence, the concept of indirect detection has gained importance, in which the SERS signal provided by the SERS tag indirectly provides identification and localization of the target. In this brief review, aimed both at the expert scientist and the novice, the anatomy of a SERS tag is first described, which includes the gold nanoparticle, Raman reporter molecules, a coating layer, and targeting moieties, and the concept of hot spot is explained. A brief overview of the most recent imaging applications in vitro, ex vivo, and in vivo is also provided, along with specific recommendations toward the synthesis of effective SERS tags that could find application in the biomedical field, and meet specific needs of the clinical community. Major emphasis is placed on the concept of multiplexing, which is perhaps the most important feature of SERS tags that could render their clinical application a reality. © 2015 IOP Publishing Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Journal of Optics (United Kingdom)

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

58

✓ **عنوان پژوهش:**

Surface-Enhanced Raman Scattering for Rapid Detection and Characterization of Antibiotic-Resistant Bacteria

✓ **نویسندگان:**

Galvan D.D., Yu Q.

✓ **خلاصه پژوهش:**

As the prevalence of antibiotic-resistant bacteria continues to rise, biosensing technologies are needed to enable rapid diagnosis of bacterial infections. Furthermore, understanding the unique biochemistry of resistance mechanisms can facilitate the development of next generation therapeutics. Surface-enhanced Raman scattering (SERS) offers a potential solution to real-time diagnostic technologies, as well as a route to fundamental, mechanistic studies. In the current review, SERS-based approaches to the detection and characterization of antibiotic-resistant bacteria are covered. The commonly used nanomaterials (nanoparticles and nanostructured surfaces) and surface modifications (antibodies, aptamers, reporters, etc.) for SERS bacterial detection and differentiation are discussed first, and followed by a review of SERS-based detection of antibiotic-resistant bacteria from environmental/food processing and clinical sources. Antibiotic susceptibility testing and minimum inhibitory concentration testing with SERS are then summarized. Finally, recent developments of SERS-based chemical imaging/mapping of bacteria are reviewed. © 2018 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

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✓ **نام ژورنال:**

Advanced Healthcare Materials

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

57

✓ **عنوان پژوهش:**

SERS detection of food contaminants by means of portable Raman instruments

✓ **نویسندگان:**

Pilot R.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) has been emerging as a powerful tool for the detection of a variety of analytes due to its very high sensitivity and fingerprinting recognition capabilities. Technological progresses in the equipment for Raman analysis are contributing to its transition from a technically demanding research method to a more widely available analytical technique. In particular, the commercialization of portable or handheld instruments has opened up the possibility of performing in situ analysis. In this review, a selection of the SERS substrates that are expected to be more suitable for use in combination with portable instruments is presented: Substrates are compared, for example, in terms of performance, reproducibility, ease of fabrication, and surface area. Moreover, this paper provides a survey of the current diffusion of portable Raman instruments in the SERS detection of food contaminants: The investigation of several analytes is summarized (mainly toxins, virus, bacteria, pesticides, forbidden food dyes, and preservatives), reporting on the limits of detection and on the eventual coupling with concentration or separation techniques. A brief perspective on possible future developments of the SERS detection with portable instruments is also provided. Copyright © 2018 John Wiley & Sons, Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

10.1002/jrs.5400

✓ **نام ژورنال:**

Journal of Raman Spectroscopy

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

57

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Interrogating Cells, Tissues, and Live Animals with New Generations of Surface-Enhanced Raman Scattering Probes and Labels

✓ **نویسندگان:**

Kneipp J.

✓ **خلاصه پژوهش:**

Surface-enhanced Raman scattering (SERS) probes and labels exploit surface-enhanced Raman signatures of specifically chosen reporter molecules and intrinsic biomolecules in the plasmonic near field of gold and silver nanostructures. They offer several advantages over other optical labels and sensors with respect to sensitivity and selectivity, mobility, and biocompatibility. Here, the multifunctionality and versatility of SERS labels that come from the vibrational spectroscopic information and their ability to act as nanoprobes of a biological environment are discussed. Surface-enhanced Raman scattering probes have the potential to become the next-generation sensor technology for monitoring cells and tissues. They improve our understanding of cellular function and will play a major role in future theranostic applications. © 2017 American Chemical Society.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

ACS Nano

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

57

✓ **عنوان پژوهش:**

Surface-enhanced Raman spectroscopy at single-molecule scale and its implications in biology

✓ **نویسندگان:**

Wang Y., Irudayaraj J.

✓ **خلاصه پژوهش:**

Single-molecule (SM) spectroscopy has been an exciting area of research offering significant promise and hope in the field of sensor development to detect targets at ultra-low levels down to SM resolution. To the experts and developers in the field of surface-enhanced Raman spectroscopy (SERS), this has often been a challenge and a significant opportunity for exploration. Needless to say, the opportunities and excitement of this multidisciplinary area impacts span the fields of physics, chemistry and engineering, along with a significant thrust in applications constituting areas in medicine, biology, environment and agriculture among others. In this review, we will attempt to provide a quick snapshot of the basics of SM-SERS, nanostructures and devices that can enable SM Raman measurement. We will conclude with a discussion on SERS implications in biomedical sciences. © 2012 The Author(s) Published by the Royal Society.

✓ **لینک** DOI **(استفاده برای دانلود مقاله)**

10.1098/rstb.2012.0026

✓ **نام ژورنال:**

Philosophical Transactions of the Royal Society B: Biological Sciences

✓ **سال انتشار:**

2013

✓ **تعداد ارجاعات:**

57

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Exploring the margins of SERS in practical domain: An emerging diagnostic modality for modern biomedical applications

✓ **نویسندگان:**

Joseph M.M., Narayanan N., Nair J.B., Karunakaran V., Ramya A.N., Sujai P.T., Saranya G., Arya J.S., Vijayan V.M., Maiti K.K.

✓ **خلاصه پژوهش:**

Excellent multiplexing capability, molecular specificity, high sensitivity and the potential of resolving complex molecular level biological compositions augmented the diagnostic modality of surface-enhanced Raman scattering (SERS) in biology and medicine. While maintaining all the merits of classical Raman spectroscopy, SERS provides a more sensitive and selective detection and quantification platform. Non-invasive, chemically specific and spatially resolved analysis facilitates the exploration of SERS-based nano probes in diagnostic and theranostic applications with improved clinical outcomes compared to the currently available so called state-of-art technologies. Adequate knowledge on the mechanism and properties of SERS based nano probes are inevitable in utilizing the full potential of this modality for biomedical applications. The safety and efficiency of metal nanoparticles and Raman reporters have to be critically evaluated for the successful translation of SERS in to clinics. In this context, the present review attempts to give a comprehensive overview about the selected medical, biomedical and allied applications of SERS while highlighting recent and relevant outcomes ranging from simple detection platforms to complicated clinical applications. © 2018 Elsevier Ltd

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Biomaterials

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

56

✓ **عنوان پژوهش:**

Progress in multifunctional surface-enhanced Raman scattering substrate for detection

✓ **نویسندگان:**

Yang L., Li P., Liu J.

✓ **خلاصه پژوهش:**

In recent years, surface-enhanced Raman scattering (SERS) has attracted tremendous attention and has been widely used as a powerful analytical tool. Simultaneously, a variety of SERS substrates also have been explored in order to obtain sensitive and reproducible detection. Though researchers have designed and fabricated several SERS-active substrates by employing new technological methods, these substrates have not gotten rid of disadvantages of single-use or single function compared with multifunctional substrates. These limit the development of SERS substrates and promote researchers to prepare new-type multifunctional SERS substrates that not only provide real-time representation of information by monitoring and tracing detection but also have a high sensitivity and reproducibility. This review first reports the applications of multifunctional materials as SERS substrates, which involve a wider range of use in nontraditional but important degradation of organic contaminants, enrichment of target analytes, assembly of nano-materials and imaging of living cells/organisms. We expect this review to be of interest to researchers who could benefit from multifunctional SERS substrates on the basis of the native advantages of unprecedented sensitivity and non-destructive signals of this type of spectroscopy. This journal is © the Partner Organisations 2014.

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✓ **نام ژورنال:**

RSC Advances

✓ **سال انتشار:**

2014

✓ **تعداد ارجاعات:**

56

✓ **عنوان پژوهش:**

Metal-organic frameworks: opportunities and challenges for surface-enhanced Raman scattering-a review

✓ **نویسندگان:**

Lai H., Li G., Xu F., Zhang Z.

✓ **خلاصه پژوهش:**

The discovery of metal-organic frameworks (MOFs) has opened a new era in materials science investigations and applications in traditional fields due to their unique structures and properties. Recently, MOF-based surface-enhanced Raman scattering (SERS) has attracted much attention because MOFs can endow substrates with excellent properties to improve the sensing performance of traditional SERS substrates, such as molecular enrichment ability, selectivity, gas sensing capability, and additional chemical enhancement ability. Meanwhile, SERS can provide ultrasensitive fingerprint spectra for the rapid, non-invasive detection of trace analytes via effective SERS substrates. These advantages of the combination of MOFs and the SERS technique greatly advance the development of SERS and widen its application. To better understand this new application scenario, herein, we briefly introduce the recent progress of MOF substrates in SERS, mainly including the unique advantages of MOFs in the sensing performance improvement in SERS. Then, we present representative MOF-based SERS substrates. Furthermore, the SERS application of effective MOF-based substrates is also reviewed, including in food safety, environmental analysis, bio-medicine, real-time monitoring and other SERS applications. Finally, we present our conclusions and perspectives. This journal is © 2020 The Royal Society of Chemistry.

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Journal of Materials Chemistry C

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

55

✓ **عنوان پژوهش:**

Three-dimensional SERS hot spots for chemical sensing: Towards developing a practical analyzer

✓ **نویسندگان:**

Liu H., Yang L., Liu J.

✓ **خلاصه پژوهش:**

Robust surface-enhanced Raman scattering (SERS) detection of chemicals in real environmental samples remains a huge challenge because of the use of a complex unknown sample, low molecular affinity for metal surface, or the inefficient use of hot spots. The controlling of hot spots for SERS enhancement has led to an in-depth development of various plasmonic nanostructures. Recently, three-dimensional (3D) hot spots are actively pursued to increase the number and efficiency of hot spots in all three dimensions. This study summarizes the recent progress in the fabrication of novel 3D plasmonic nanostructures and discusses the evolution of flexible and liquid-state designs of 3D hot spots, which have recently emerged as a promising SERS technique. Finally, we present a prospective overview for challenges and future perspectives. Although not exhaustive, this study presents some of the most interesting methodologies for fabricating and controlling 3D hot spots and assists researchers in understanding the evolution and challenges in this field, thereby furthering interest in developing chemical-sensing SERS techniques. © 2016 Elsevier B.V.

✓ **لینک** DOI (**استفاده برای دانلود مقاله**)

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TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

55

✓ **عنوان پژوهش:**

Surface Enhanced Raman Spectroscopy in environmental analysis, monitoring and assessment

✓ **نویسندگان:**

Ong T.T.X., Blanch E.W., Jones O.A.H.

✓ **خلاصه پژوهش:**

Environmental pollution is usually monitored via mass spectrometry-based approaches. Such techniques are extremely sensitive but have several disadvantages. The instruments themselves are expensive, require specialized training to use and usually cannot be taken into the field. Samples also usually require extensive pre-treatment prior to analysis which can affect the final result. The development of analytical methods that matched the sensitively of mass spectrometry but that could be deployed in the field and require minimal sample processing would be highly advantageous for environmental monitoring. One method that may meet these criteria is Surface Enhanced Raman Spectroscopy (SERS). This is a surface-sensitive technique that enhances Raman scattering by molecules adsorbed on rough nanostructure surfaces such as gold or silver nanoparticles. SERS gives selective spectral enhancement such that increases in sensitivity of 1010 to 1014 have been reported. While this means SERS is, theoretically at least, capable of single molecule detection such a signal enhancement is hard to achieve in practice. In this review the background of SERS is introduced for the environmental scientist and the recent literature on the detection of several classes of environmental pollutants using this technique is discussed. For heavy metals the lowest limit of detection reported was 0.45 μg/L for Mercury; for pharmaceuticals, 2.4 μg/L for propranolol; for endocrine disruptors, 0.35 μg/L for 17β-estradiol; for perfluorinated compounds, 500 μg/L for perfluorooctanoic acid and for inorganic pollutants, 37g/L for general pesticide markers. The signal enhancements achieved in each case show great promise for the detection of pollutants at environmentally relevant concentrations and, although it does not yet routinely match the sensitivity of mass spectrometry. Further work to develop SERS methods and apply them for the detection of contaminants could be of wide benefit for environmental science. © 2020 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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Science of the Total Environment

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

54

✓ **عنوان پژوهش:**

Recent advance in SERS techniques for food safety and quality analysis: a brief review

✓ **نویسندگان:**

Lin Z., He L.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy (SERS) has shown a wide array of applications in food safety and quality to detect and analyze chemical and microbiological hazards. SERS technique offers advantages over traditional analytical techniques as a rapid, sensitive 'fingerprinting' and field-deployable analytical tool. However, SERS technique still faces challenges when applied for analysis of complex food matrices. Recent advance in SERS techniques for food safety and quality application has been focusing on developing enhanced SERS substrates and methodologies 1) to enhance the sensitivity and selectivity and reduce matrix interferences, 2) to enable non-destructive sampling and in situ detection. Chemical modifications have been conducted on SERS substrates to immobilize molecular capturing agents (e.g. functional ligands, molecular imprinted polymers (MIPs), aptamers) and to enhance analytical sensitivity. Enrichment methodologies (filtration, microfluidic, MIPs, thin-layer chromatography) have been incorporated with SERS to separate and concentrate target analytes from matrices. SERS active in situ sampling substrates (e.g. SERS tape, SERS fiber, SERS needle) were developed to enable non-destructive sampling and in situ analysis. In this brief review, we will summarize some recent development and application of SERS techniques for food safety and quality analysis and our perspective for future development. © 2019 Elsevier Ltd

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✓ **نام ژورنال:**

Current Opinion in Food Science

✓ **سال انتشار:**

2019

✓ **تعداد ارجاعات:**

54

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Recent advances in surface-enhanced raman spectroscopy (SERS): Finite-difference time-domain (FDTD) method for SERS and sensing applications

✓ **نویسندگان:**

Zeng Z., Liu Y., Wei J.

✓ **خلاصه پژوهش:**

There have been significant advancements in the field of surface-enhanced Raman spectroscopy (SERS). Despite being an ultra-sensitive analytical technique, challenges, such as how to get a proper match between the SERS substrate and light for better signal enhancement to obtain a stable, sensitive SERS substrate, prevent its widespread applications. Finite-difference time-domain (FDTD) method, a numerical tool for modeling computational electrodynamics, has recently been used to investigate SERS for understanding the underlying physics, and optimally design and fabricate SERS substrates for molecular analysis. In this review, we summarize the trend of using FDTD method in SERS studies by providing an introduction of fundamental principles, the studies of optical responses, electromagnetic (EM) field distribution, enhancement factor (EF) of SERS, the application in design and fabrication of SERS substrates, and SERS for biosensing and environmental analysis. Finally, the critical issues of using inherently approximate FDTD method and future improvement for solving EM problems and SERS applications are discussed. © 2015 Elsevier B.V.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

TrAC - Trends in Analytical Chemistry

✓ **سال انتشار:**

2016

✓ **تعداد ارجاعات:**

54

TEKSAN Detect Precisely

✓ **عنوان پژوهش:**

Clinical SERS: Are we there yet?

✓ **نویسندگان:**

Kho K.W., Fu C.Y., Dinish U.S., Olivo M.

✓ **خلاصه پژوهش:**

Surface Enhanced Raman Spectroscopy or SERS has witnessed many successes over the past 3 decades, owing particularly to its simplicity of use as well as its highly-multiplexing capability. This article provides an overview of SERS and its applicability in the field of bio-medicine. We will preview recent developments in SERS substrate designs, and the various sensing technologies that are based on the SERS phenomenon. An overview of the clinical applications of SERS is also included. Finally, we provide an opinion on the future trends of this unique spectroscopic technique. © 2011 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Journal of Biophotonics

✓ **سال انتشار:**

2011

✓ **تعداد ارجاعات:**

54

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Surface-enhanced raman scattering-based immunoassay technologies for detection of disease biomarkers

✓ **نویسندگان:**

Smolsky J., Kaur S., Hayashi C., Batra S.K., Krasnoslobodtsev A.V.

✓ **خلاصه پژوهش:**

Detection of biomarkers is of vital importance in disease detection, management,and monitoring of therapeutic efficacy. Extensive efforts have been devoted to the development of novel diagnostic methods that detect and quantify biomarkers with higher sensitivity and reliability,contributing to better disease diagnosis and prognosis. When it comes to such devastating diseases as cancer, these novel powerful methods allow for disease staging as well as detection of cancer at very early stages. Over the past decade, there have been some advances in the development of platforms for biomarker detection of diseases. The main focus has recently shifted to the development of simple and reliable diagnostic tests that are inexpensive, accurate, and can follow a patient's disease progression and therapy response. The individualized approach in biomarker detection has been also emphasized with detection of multiple biomarkers in body fluids such as blood and urine. This review article covers the developments in Surface-Enhanced Raman Scattering (SERS) and related technologies with the primary focus on immunoassays. Limitations and advantages of the SERS-based immunoassay platform are discussed. The article thoroughly describes all components of the SERS immunoassay and highlights the superior capabilities of SERS readout strategy such as high sensitivity and simultaneous detection of a multitude of biomarkers. Finally, it introduces recently developed strategies for in vivo biomarker detection using SERS. © 2017 by the authors; licensee MDPI, Basel, Switzerland.

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✓ **نام ژورنال:**

Biosensors

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

53

✓ **عنوان پژوهش:**

Recent developments of flexible and transparent SERS substrates

✓ **نویسندگان:**

Li Z., Huang X., Lu G.

✓ **خلاصه پژوهش:**

Surface enhanced Raman scattering (SERS) is a sensitive chemical analysis technique, and the huge Raman enhancement is mainly contributed by surface plasmon resonance of the metal nanoparticles immobilized on support substrates. Compared with the SERS-active nanostructures on rigid supports, the ones on flexible and transparent films provide a non-invasive SERS detection by being attached onto the surface of interest. Moreover, these SERS-active films could be easily reused. Owing to these advantages, these films have attracted much attention in many fields in the past few years. In this review, we have summarized and discussed the recent developments in the fabrication and application of transparent and flexible SERS-active films. First, the fabrication techniques are summarized and divided into four categories, in situ wet chemical synthesis of plasmonic structures, physical deposition of plasmonic metals, nanoparticle adsorption and nanoparticle embedding, based on how plasmonic structures are constructed on flexible substrates. After that, the applications of these SERS-active films are reviewed. They could be used for qualitative and quantitative detection of small molecules, in situ and non-invasive detection of chemical compounds on solid surfaces, spatial mapping of chemical information, as well as for fundamental study. Finally, the challenges and perspectives of this field are presented. It is believed that this review will be helpful for the design, fabrication and application of novel highly efficient SERS systems, especially for real-life applications. © The Royal Society of Chemistry.

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Journal of Materials Chemistry C

✓ **سال انتشار:**

2020

✓ **تعداد ارجاعات:**

50

✓ **عنوان پژوهش:**

Surface enhanced Raman spectroscopy: A review of recent applications in forensic science

✓ **نویسندگان:**

Fikiet M.A., Khandasammy S.R., Mistek E., Ahmed Y., Halámková L., Bueno J., Lednev I.K.

✓ **خلاصه پژوهش:**

Surface enhanced Raman spectroscopy has many advantages over its parent technique of Raman spectroscopy. Some of these advantages such as increased sensitivity and selectivity and therefore the possibility of small sample sizes and detection of small concentrations are invaluable in the field of forensics. A variety of new SERS surfaces and novel approaches are presented here on a wide range of forensically relevant topics. © 2018 Elsevier B.V.

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Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy

✓ **سال انتشار:**

2018

✓ **تعداد ارجاعات:**

50

TEKSAN
Detect Precisely

✓ **عنوان پژوهش:**

Analytical characterization using surface-enhanced Raman scattering (SERS) and microfluidic sampling

✓ **نویسندگان:**

Wang C., Yu C.

✓ **خلاصه پژوهش:**

With the rapid development of analytical techniques, it has become much easier to detect chemical and biological analytes, even at very low detection limits. In recent years, techniques based on vibrational spectroscopy, such as surface enhanced Raman spectroscopy (SERS), have been developed for non-destructive detection of pathogenic microorganisms. SERS is a highly sensitive analytical tool that can be used to characterize chemical and biological analytes interacting with SERS-active substrates. However, it has always been a challenge to obtain consistent and reproducible SERS spectroscopic results at complicated experimental conditions. Microfluidics, a tool for highly precise manipulation of small volume liquid samples, can be used to overcome the major drawbacks of SERS-based techniques. High reproducibility of SERS measurement could be obtained in continuous flow generated inside microfluidic devices. This article provides a thorough review of the principles, concepts and methods of SERS-microfluidic platforms, and the applications of such platforms in trace analysis of chemical and biological analytes. © 2014 IOP Publishing Ltd.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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✓ **نام ژورنال:**

Nanotechnology

✓ **سال انتشار:**

2015

✓ **تعداد ارجاعات:**

50

✓ **عنوان پژوهش:**

Advances in flexible surface-enhanced Raman scattering (SERS) substrates for nondestructive food detection: Fundamentals and recent applications

✓ **نویسندگان:**

Zhang D., Pu H., Huang L., Sun D.-W.

✓ **خلاصه پژوهش:**

Background: Food safety has attracted considerable attention in recent years. As a rapid, fingerprint-type recognition and nondestructive detection technique, surface-enhanced Raman scattering (SERS) has been among the promising techniques to meet the increasing needs for food safety analysis. Currently, emerging flexible SERS substrates as an alternative for colloidal and rigid SERS substrates have received great interest. Flexible SERS substrates possess the advantages of easy sampling by wrapping or swabbing on nonplanar surfaces, which facilitate the detection of contaminants from food surfaces and shed new lights on the nondestructive and sensitive detection of food analytes. Scope and approach: In this review, the characteristics of different flexible materials such as cellulose, polymer film, cotton fabric, adhesive tape and bio-materials for constructing flexible SERS substrates are introduced, detection strategies including infiltration scheme, swab-sampling and in-situ detection are discussed, and recent applications of flexible SERS substrates in detecting trace pesticides in fruits and vegetables, chemical residues in animal farming including fungicides and antibiotics, illegal food additives and food-borne pathogens are highlighted. Key findings and conclusions: Flexible SERS substrates have been increasingly studied for detecting food contaminants. In preparing SERS substrates, different properties of the materials should be considered. For the detection strategies, compared with conventional infiltration scheme, swab-sampling is unique for flexible substrates and can collect target molecules directly from the surface, while in-situ detection is the most convenient, facile and nondestructive. Encouraging application results available show that flexible SERS substrates possess enormous potentials for food safety analysis and surveillance. © 2021 The Authors

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Trends in Food Science and Technology

✓ **سال انتشار:**

2021

✓ **تعداد ارجاعات:**

49

✓ **عنوان پژوهش:**

Bioanalytical measurements enabled by Surface-Enhanced Raman Scattering (SERS) probes

✓ **نویسندگان:**

Jamieson L.E., Asiala S.M., Gracie K., Faulds K., Graham D.

✓ **خلاصه پژوهش:**

Since its discovery in 1974, surface-enhanced Raman scattering (SERS) has gained momentum as an important tool in analytical chemistry. SERS is used widely for analysis of biological samples, ranging from in vitro cell culture models, to ex vivo tissue and blood samples, and direct in vivo application. New insights have been gained into biochemistry, with an emphasis on biomolecule detection, from small molecules such as glucose and amino acids to larger biomolecules such as DNA, proteins, and lipids. These measurements have increased our understanding of biological systems, and significantly, they have improved diagnostic capabilities. SERS probes display unique advantages in their detection sensitivity and multiplexing capability. We highlight key considerations that are required when performing bioanalytical SERS measurements, including sample preparation, probe selection, instrumental configuration, and data analysis. Some of the key bioanalytical measurements enabled by SERS probes with application to in vitro, ex vivo, and in vivo biological environments are discussed. © 2017 by Annual Reviews.

✓ **لینک DOI (استفاده برای دانلود مقاله)**

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Annual Review of Analytical Chemistry

✓ **سال انتشار:**

2017

✓ **تعداد ارجاعات:**

49

✓ **عنوان پژوهش:**

A review of the preparation and application of magnetic nanoparticles for surface-enhanced Raman scattering

✓ **نویسندگان:**

Lai H., Xu F., Wang L.

✓ **خلاصه پژوهش:**

In recent years, the unique properties of magnetic functional nanomaterials have received considerable attentions and show promising applications in separation, detection, diagnosis, catalysis, environment remediation and so on. Specifically, introducing magnetic nanomaterials (MNPs) into traditional sensing techniques greatly simplifies detection operation and improves sensing performances, which makes magnetic nanomaterial-based sensing techniques become a hot research topic. Compared with other sensing techniques such as chromatography, fluorescence, mass spectrum and electrochemistry, surface-enhanced Raman scattering (SERS) displays unique properties of high-sensitivity, fingerprint specificity and nondestructive detection. The introduction of MNPs in SERS has proven to be an efficient way to resolve several critical challenges in practical SERS analysis leading to highly efficient target separation and enrichment, high-sensitive detection and precise outcomes analysis. This makes the MNPs involved SERS analysis a powerful technique with very appealing and promising application in various branches of analytical science. In this review, we first briefly introduced the preparation, encapsulation and surface modification of magnetic nanoparticles, assembly of magnetic nanoparticle–plasmonic substrates and then discussed their applications in SERS analysis, including biomedical application, environmental analysis, food safety and chemical reaction monitoring. Finally, we presented some outlooks on further developments of magnetic nanoparticles in SERS applications. © 2018, Springer Science+Business Media, LLC, part of Springer Nature.

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