UNIVERSITATEA BABEŞ-BOLYAI
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Domenii de cercetare

Interesul cercetarilor este focalizat pe utilizarea spectroscopiei Raman amplificata de suprafata (SERS) intr-o gama larga de aplicatii cum ar fi analiza unor compusi farmaceutici sau de interes biomedical, detectia unor poluanti, dezvoltarea si caracterizarea unor substrate active SERS, etc. Investigatiile SERS ale compusilor farmaceutici sau de interes biomedical au ca rezultat elucidarea adsorbtiei lor pe suprafata nanoparticulelor de Ag/Au, proces considerat o mimare a adsorbtiei care are loc in organism. In acest scop sunt utilizate si metodele spectroscopice IR si Raman precum si calculele DFT. Tehnica SERS este de asemenea utilizata pentru detectia unor concentratii mici de poluati adsorbiti pe suprafata nanoparticulelor metalice din diferite materiale functionale. In plus, sunt avute in vedere si studii referitoare la dezvoltarea unor substrate SERS reutilizabile (cu proprietati de auto-curatare); a unor substrate pe baza de structuri carbonice (de ex. oxid de grafena, oxid de grafena redus) decorate cu nanoparticule de metal nobil, precum si a altor tipuri de substrate active SERS eficiente. Proprietatile optice ale acestor substrate sunt analizate cu ajutorul spectroscopiei de absorbtie in UV-Vizibil iar eficienta lor este testata cu ajutorul unor molecule test. Informatii despre alte directii de cercetare posibile gasiti la http://www.phys.ubbcluj.ro/~monica.baia/.

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Research interest

The research interest is mainly focused on the use of surface-enhanced Raman spectroscopy (SERS) for a wide range of applications such as biomedical and pharmaceutical compounds analysis, pollutants detection, design and characterization of SERS-active substrates, etc.. SERS investigations of biomedical and pharmaceutical compounds have as result the elucidation of the adsorption behavior of these molecules on the Ag/Au surface as a mimic of the adsorption that take place into the organism. For accomplishing this task IR and Raman spectroscopy combined with DFT-based calculations are also involved. SERS technique is also employed for detecting small amounts of pollutant species adsorbed on metallic nanostructures surface from different functional materials. Moreover, studies regarding the development of reusable or self-cleaning SERS substrates; substrates based on carbonaceous structures (e.g., graphene oxide or reduced graphene oxide) decorated with noble metal nanoparticles, and other highly efficient SERS-active substrates are foreseen. The optical properties of the new designed substrates are analyzed by UV-Vis absorption spectroscopy and their efficiency is established by test molecules. Information about other possible research directions can be found at http://www.phys.ubbcluj.ro/~monica.baia/.