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Surface enhanced Raman scattering for sensitive arsenic detection

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Coinage metals have many applications in analytical chemistry. In 1974, Fleishman and Hendra made a break through discovery and that is now known as surface enhanced Raman scattering (SERS). To observe SERS, association of metallic silver substrate was thought to be mandatory. Later on SERS measurement has been extended to gold and copper substrates also. Though the horizon of SERS activity has further been extended to transition metals but coinage metals seem to have better promise. Rich plasmon band in the visible range for the coinage metals and available low cost visible laser light are now accounted in general to explain SERS measurements. Electromagnetic effect (EM) and chemical effect (CE) conjointly made the SERS measurements sensitive down to single molecular level. There authentication of the molecules under test comes from 'blinking'. However, SERS is already selective from the vibrational signatures of the test molecules leaving aside fluorescence phenomenon. To observe sensitive SERS activity, fabrication of 'hot spot' involving coinage metal nanoparticles is the upcoming area of research. Their galvanic replacement, 'Soft Hard Acid Base' (SHAB) property, nobility and composite effect have been considered, recently by the author and team, to evolve novel SERS substrates. Thus it was able to detect toxic water soluble dosage of arsenate while present in the ppt (parts-per trillion) level.

Biography

Tarasankar Pal, PhD, DSc is a Professor of Inorganic Chemistry at the Indian Institute of Technology, Kharagpur. He visited different universities of the globe as 'Visiting Professor.' He has introduced a bench mark organic reaction for testing the catalytic property of diverse metal NPs and has shown transition metal as a SERS substrate. He has published ~300 papers and received a number of medals. He is the recipient of the R&D - 100 awards from the USA. Recently he has received President's Award from the Tokyo University of Science. He is a fellow of the Indian National Academy of Science, Allahabad.

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