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Plasmonics for plasmon-enhanced single-molecule spectroscopy

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Plasmonics, which is a new branch of photonics, is based on the interaction of light with surface plasmon in nanostructured free-electron-rich metallic structures. Surface plasmon is a collective excitation of the electrons within the conduction band of a metal. Localized surface plasmon resonances occurring in metallic nanoparticles generates confined light fields, which enables enhancement of Raman scattering and nonlinear processes. Enhancement of signal amplification by localized surface plasmon was first discovered as surface-enhanced Raman scattering (SERS, in 1974) then made another techniques, tip-enhanced Raman scattering (TERS, in 2000) and surface-enhanced coherent anti-stokes Raman scattering (SE-CARS, in 1994). These three types of plasmon-enhanced vibrational spectroscopies have certain potential for the detection of any types of molecules at single-molecule level along with refinement of metallic nanostructures, however, only few specific molecules were reported as target molecules at single-molecule level. In this talk, the reported experiments which already succeeded plasmon-enhanced single-molecule detections using SERS, TERS and SE-CARS will be introduced and what is needed more will be discussed for universal detection of molecules using plasmon-enhanced single-molecule spectroscopy.

Biography

Yuko S Yamamoto is growing as a spectroscopist particularly based on Raman spectroscopy and plasmon-enhanced spectroscopy. She studied chemistry and completed PhD (2011) from Kwansei Gakuin University, Japan. After Post-doctoral work at National Institute of Advanced Industrial Science and Technology (AIST, Japan), she received the research fellowship for young scientists position of Japan Society for the Promotion of Science (JSPS) in Kagawa University, Japan (2014). Her specialties are Raman spectroscopy and surface-enhanced Raman spectroscopy (SERS). Her current research interests are single-molecule spectroscopy based on SERS, Tip-enhanced Raman spectroscopy (TERS) and surface-enhanced coherent anti-Stokes Raman spectroscopy (SE-CARS).

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