第282回触媒化学研究センターコロキウム（談話会）

共催　北海道大学グローバルCOEプログラム「触媒が先導する物質科学イノベーション」・日本化学会北海道支部・日本分光学会北海道支部・日本分析化学会北海道支部

Substrates for SEIRA and SERS produced by electroless deposition and microemulsions

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Seminar Room BC, Sousei Hall, Hokkaido University

（北海道大学創成科学研究棟4階セミナー室BC）

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Many ways of fabricating substrates for surface-enhanced Raman scattering (SERS) have been described but most are time consuming to make and few give reproducibility much better than ±10%. Far fewer ways of fabricating substrates for surface-enhanced infrared absorption (SEIRA) have been reported, with most of the earliest work having been carried out by physical vapor deposition of gold and silver onto appropriate substrates (often a ZnSe internal reflection element.) The preparation of substrates for SERS and SEIRA by electroless deposition involves the spontaneous reduction of metal ions (usually Ag+ or AuCl4-) by germanium or silicon. In its simplest manifestation, a Ge disk is simply immersed in a dilute solution of the appropriate metal salt for a time that depends on the concentration of the salt and the desired morphology of the deposited metal. When Si disks are used, the oxide layer is removed by incorporating dilute HF in the solution. Different conditions are usually required to achieve the optimum enhancement factor for SERS or SEIRA. We have shown that the SERS enhancement factor of thiols increases when silver-coated Ge disks are left in an aqueous environment for a few hours. SEM images suggest that the particles are becoming smoother by a process of Ostwald ripening but a combination of TEM and Raman microspectroscopy shows that SERS hot spots are being formed during the ripening process when two nanoparticles merge. In a separate project, the preparation of small (<5 nm) monodisperse nanoparticles has been accomplished by forming the nanoparticles in reverse micelles. Particles with a reproducible size as small as 2 nm have been prepared in this way. Transferring the particles to a suitable substrate has proved challenging but both SEIRA and SERS spectra have been acquired from particles fabricated using this technique.

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本講演は『総合化学特別研究第二』の一部として認定されています．また，日本分光学会主催の『Symposium on Advanced Spectroscopy』（http://www.cat.hokudai.ac.jp/osawa/）の一部として開催しますので，ご関心のある方はシンポジウムもあわせてご参加ください．

282nd Catalysis Research Center (CRC) Colloquium

Hokkaido University Global COE Program "Catalysis as the Basis for the Innovation in Materials Science", Hokkaido Branches of The Chemical Society of Japan, The Spectroscopical Society of Japan and The Electrochemical Society of Japan