

SEMINAR

Tuesday, 3rd July, 12.00 pm, Seminar Room

Host: Prof. Luis M. Liz-Marzán

Investigating the Heterogeneous Nucleation in Nanocrystal Growth with an Isocyanide Probe by Surface-Enhanced Raman Scattering

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Bimetallic nanocrystals, made of two different metal species, have properties that are often superior to their single-metal counterparts. The arrangement of the two different metals relative to each other in the nanocrystal is very important in determining the nanocrystal properties, and considerable effort has been made to deposit one metal atop the nanocrystal surface of another metal with precision in location. It remains a grand challenge to detect and quantify the metal being deposited, particularly when the nanocrystals are still suspended in the reaction medium undergoing growth. In this talk, I will report our recent progress to address this challenge by developing a class of molecules, the isocyanides (molecules containing the -NC chemical group), as probes for in situ characterization with detection of the isocyanides by a spectroscopic technique, surface-enhanced Raman scattering (SERS). I will demonstrate that the vibrational frequency of 2,6-dimethylphenyl isocyanide (2,6-DMPI) can serve as a distinctive reporter for platinum and palladium atoms being deposited on the edges of silver nanocubes, with a detection limit well below one monolayer. Remarkably, SERS analysis can be conducted while the particles are still suspended in the original reaction solution, making it possible for probing the heterogeneous nucleation and early-stage deposition events in real time.