The Hebrew University Center for Nanoscience & Nanotechnology

Nano Seminar

Polyoxometalate-Engineered Gold-Nanoparticle Building Blocks

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Abstract:

In 2008, we used cryogenic transmission electron spectroscopy (cryo-TEM) to obtain the first direct images of POM-monolayer shells on metal(0) nanoparticles in water [1 - 4]. The combined use of solution-state and microscopy methods has since led to detailed understanding of the electrostatic interactions responsible for their self-assembly [5], information regarding orientations of asymmetric cluster anion protecting ligands [6], and insight into how POM ligands control catalysis at the gold-nanoparticle surface [7]. In parallel, we used the POMs as "self-reporting" leaving groups for rationally controlling reactions of gold cores with alkanethiols in water. These studies now include investigations of alkanethiolate ligand-shell formation on spherical gold nanoparticles [8], and the regio-selective placement of anionic thiols at the edges of the polyhedral gold nanocrystals [9]. Subsequent studies focused on the development of gold-nanoparticle building blocks for the synthesis of 1) entropically stabilized micron-sized polymers [10], 2) responsive micelle-like aggregates of amphiphilic gold nanoparticles that respond to hydrophobic guests by encapsulating them as liquid nanodroplets within 250-nm diameter, gold-NP membranes [11], and 3) gold nanoparticle supraspheres that serve as hosts for the hydrophobic uptake, transport and subsequent release of over two million organic guests, exceeding by five orders of magnitude the capacities of individual supramolecular cages or containers, while on a mass-per-volume basis, rivalling those of zeolites and metal-organic frameworks (MOFs) [12].

References

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Gathering & Refreshments at 10:50

Please contact Alexandra Bannych at 6584919 if you are interested in meeting the lecturer.

Tuesday, June 27th 2017, 11:00 at the Seminar Hall

Los Angeles Building, entrance floor.