Invites you all to a Seminar on

Nanomaterials - Friends or Foes: Tools for the Detection of Nanoparticles

Date & Time: February 13, 2023 (Monday), 03:00 pm
Venue: LH-212, Lecture Hall Complex, IIT-Delhi

Abstract

This contribution deals with a new exciting approach that aims to detect nanoparticles (NPs) selectively. With the benefits that NPs bring due to their unique properties that are a result of their size, they also pose a threat. Nanotoxicology is a new discipline, that deals with the adverse effects of NPs. Evidently, the detection of NPs requires the development of appropriate tools. The toxicity of NPs is affected by the core, size, shape, and stabilizing shell of the NPs. Hence, the speciation of NPs is becoming of utmost importance.

We have developed a new concept for the selective recognition and detection of NPs termed nanoparticle imprinted matrices (NAIM).[1-5] It is analogous to the well-known concept of molecularly imprinted polymers (MIP) in which the molecular analyte is imprinted in a polymer by polymerization of proper monomers with which it chemically associates. The removal of the template forms complementary cavities capable of selective recognition of the analyte. Instead of molecular species, we imprint NPs in various matrices (see for example Figure 1 in a diazonium matrix). The NPs are then removed to form nanometric voids that can selectively recognize the originally imprinted NPs. The NAIM approach works so well that we can detect NPs that are stabilized by different carboxylic acid short molecules.

We will present a few new systems by which we show how NPs can be imprinted inside a matrix. Approaches for studying the NP-matrix interactions, the imprinting of non-spherical NPs, and the detection of NPs from the gaseous phase, will be discussed.

Figure 1: NPs embedded in a very thin matrix on ITO

Brief CV

Daniel Mandler is a Professor of Chemistry in the Institute of Chemistry at the Hebrew University and the incumbent of Archie and Marjorie Sherman Chair in Chemistry. He holds also an adjunct Professorship at the Nanyang Technical University in Singapore and was a visiting Professor at the University of Buenos Aires, Argentina, Warwick University in the UK and Ulm University in Germany. He is the head of the Analytical Chemistry program at the Hebrew University, has supervised more than 55 MSc and PhD students, and has published over 200 papers and has a h-index of 43. In 2013 he became an ISE Fellow.