TIFR Centre for Interdisciplinary Sciences
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Seminar

Inorganic photocatalysts: The correlation of atomic-scale structure and functionality

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Nanostructures are one of the most extensively researched systems in nanoscience. Various materials are investigated due to their size dependent optical properties or due to their enhanced functionality as catalysts. Although they have been extensively researched for a few decades now, even today new fabrication routes are still explored to improve properties and to gain precise control of their structure. While reports on the optical properties of single particles are available, the quantitative characterization of atomic order on a single particle level and the growth mechanism that resulted in that specific rearrangement, are still generally missing. The majority of characterization procedures are performed on ensembles that average properties and may hinder the understanding of fundamental aspects in the colloidal synthesis.

Atomic resolution analysis, which has emerged with aberration corrected instruments, has mainly provided analysis of few particles per sample. It is now, due to the Cc correction that offers superior resolutions in low voltages that the atomic ordering can be achieved on a routine basis to deliver new statistical data. New hardware facilitates efficient acquisition of chemical data by EDS without causing deformation due to beam damage. We use these state-of-the-art instrumentation to understand growth processes and to correlate the atomic structure with properties.

Here, I will present several systems such as seeded rods of CdSe@CdS with bimetallic tips and 2D nanosheets of ternary compounds such as $CdSe_{1-x}S_x$, doped Bi_2Se_3.

Thursday, Feb 25th 2016

4:00 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS