Department of Materials Science and Engineering Seminar Series 2024

Advanced Electron Microscopy for Beam Sensitive Nanomaterials and Biomaterials

Tan Shengdong

Date and time: 28 November 2024, 10am - 12pm

Venue: EA-06-04

Abstract

Aberration-corrected scanning transmission electron microscopy (AC-STEM) enables atomic-scale imaging by correcting lens aberrations, allowing for precise visualization of individual atoms and detailed structural analysis of materials. This technique, especially when combined with high-angle annular dark field (HAADF) imaging, electron energy loss spectroscopy (EELS), and energy-dispersive X-ray spectroscopy (XEDS), provides a comprehensive view of both the structural and chemical properties of specimens, making it invaluable in materials science and nanotechnology. However, AC-STEM analysis of beam-sensitive materials, like small nanoclusters and proteins, is challenging due to their susceptibility to electron beam damage, often limiting detailed characterization. The thesis includes three projects leveraging AC-STEM to study such materials: compositional analysis of PtSn nanoclusters for propane dehydrogenation, structural analysis of Au25 nanoclusters, and probe phase calibration using 4D STEM for protein imaging. These projects highlight AC-STEM's potential to expand our understanding of delicate materials at the atomic scale, addressing the difficulties of beam sensitivity.

Biography

Tan Shengdong earned his B.Eng. degree from Beihang University in China and is currently pursuing his PhD under the supervision of Prof. He Qian. His research centers on utilizing advanced electron microscopy techniques to characterize beam-sensitive nanoparticles.

Please join us!

HOST: Prof Ding Jun