



Department of Materials Science and Engineering Seminar Series 2026

Advanced Electron Microscopy of Electric Fields and Structural Phase Transitions

Su Hongxi

Date and time: 13th August 2026 (Thursday) 15:00pm – 17:00pm

Venue: E4-04-05

Abstract

The functional properties of materials are closely linked to their local atomic structure, local electric polarization, and structural phase evolution. Resolving these features is essential for understanding the underlying physical mechanisms and for developing materials with controllable optical, electronic, and ferroic responses. In this thesis, advanced electron microscopy methods, particularly four-dimensional scanning transmission electron microscopy (4D-STEM), electron energy-loss spectroscopy (EELS), and in situ TEM are combined with nonlinear optical techniques to investigate electric-field and phase transitions in plasmonic nanostructure and in two-dimensional material systems. There are three parts:

1. A demonstration of nanoscale plasmon field mapping using 4D-STEM.
2. The thermal evolution of monolayer amorphous carbon, visualized at the atomic scale using electron ptychography.
3. Ferroelectricity of the van der Waals material NbOCl_2 is studied at the atomic scale through a combination of second-harmonic generation mapping, optical poling, and electron microscopy.

Biography

Su Hongxi is currently a Ph.D. candidate in the Department of Materials Science and Engineering at the National University of Singapore, under the supervision of A./Prof. Michel Bosman. His research focuses on advanced electron microscopy, plasmonics and two-dimensional materials.

Please join us!

HOST: Asst Prof Zhu Di