Department of Materials Science and Engineering Seminar Series 2026

ORIENTATION AND INTERFACE ENGINEERING OF EPITAXIAL HAFNIA-BASED FILMS

SU HANXIN

Date and time: Wednesday, 18th November 2026, 02:00 pm

Venue: E7-03-08 - Seminar Room 3

Abstract

Hafnium oxide–based ferroelectrics offer promising opportunities for electronic devices, yet their performance is constrained by the stability of the metastable ferroelectric phase and its crystallographic orientation. This seminar explores how doping, interface engineering and orientation control can enhance ferroelectricity in hafnium–zirconium oxide (HZO) films across different thickness regimes.

For ultrathin films, doping and lattice distortion are investigated as routes to stabilize a favorable ferroelectric structure with enhanced out-of-plane polarization. For thicker films, engineered oxide interfaces suppress monoclinic-phase formation and preserve switchable polarization over an extended thickness range. Combining interface engineering with substrate-induced orientation control further enables large polarization in thick HZO films. Structural characterization, electrical measurements and first-principles calculations reveal how composition, lattice distortion and interfaces influence phase stability and ferroelectric response.

Together, these studies establish complementary strategies for improving polarization and extending the thickness range of HZO ferroelectrics, providing a materials foundation for applications with different thickness requirements.

Biography

SU HANXIN received his bachelor’s degree in School of Material Science and Engineering, Jilin University in 2021 and his master's degree in Materials Science and Engineering from the National University of Singapore (NUS) in 2022. He is currently a Ph.D. candidate in the Department of Materials Science and Engineering at NUS, under the supervision of Prof. Chen Jingsheng. His research focuses on ferroelectric materials.

Please join us!

HOST: Asst. Prof Zhao Ming