

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR SERIES

From Atomic Defects to Emergent Electronic Materials: Engineering Structure-Property Relationships in Functional Thin Films

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The Center for Discovery and Innovation

The City College of New York

Abstract

The development of next-generation semiconductor, magnetic, and quantum technologies increasingly depends on the ability to control materials at the atomic and nanoscale. Defects, strain, surfaces, and interfaces, traditionally regarded as imperfections, can instead serve as powerful design parameters for tailoring electronic and magnetic properties. This seminar will present an integrated research approach combining controlled thin-film growth with advanced scanning probe microscopy and nanoscale electrical characterization to establish structure–property relationships in emerging functional materials. Particular emphasis will be placed on epitaxial thin films and low-dimensional materials, including transition-metal compounds, two-dimensional (2D) materials such as Mo₂C, WC, and MoS₂, and magnetic semiconductors such as MnSe and MnTe. I will discuss how atomic-scale defects, local strain, surface polarity, and interfacial structure influence conductivity, work function, and phase stability. Recent work on epitaxial growth of III-V and transition-metal chalcogenide semiconductors will highlight how substrate chemistry and surface orientation can be used to control crystal phase stability and explore emergent magnetic behavior. The talk will conclude with a research vision for engineering defects, strain, and interfaces in future semiconductor, optoelectronic, magnetic, and quantum technologies.

Speaker Bio

Dr. Gökay Adabaşı is a Presidential Postdoctoral Research Associate at the Center for Discovery and Innovation at CUNY City College of New York. He earned his B.S. and M.S. degrees in Mechanical Engineering from İzmir Institute of Technology and his Ph.D. in Mechanical Engineering from the University of California, Merced in 2025. His research focuses on thin-film synthesis, surface and interface physics, and nanoscale characterization for semiconductor, two-dimensional, and quantum technologies. His work combines Molecular Beam Epitaxy (MBE), scanning probe microscopy, and structural characterization to study electronic properties and interfacial phenomena in materials including Mo₂C, MoS₂, MnSe, and MnTe. His honors include the CUNY Presidential Postdoctoral Fellowship, NASA-funded research fellowships, presentation awards, the Outstanding Teaching Assistant Award, and First Place in the international NanoArtography Competition.

Date: Thursday, December 10, 2026

Location: Steinman 254

Time: 2:00 PM

Host: Bo Wang

Attendance open to all interested persons

