

Department of Electrical and Computer Engineering

Materials Engineering Program

Center for Integrated Bio and Nano Systems

10:00 a.m., Jan. 22, 2021

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Utilizing Transmission Electron Microscopy to Study Two-Dimensional Materials and Nano-bio Interfaces

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Abstract: Transmission electron microscopy (TEM) and its related techniques have become indispensable tools in uncovering the structure and subsequent properties/functions in materials/biomolecules. This presentation will discuss using state-of-the-art TEM techniques to study 2D materials, biomacromolecules, and their interfaces. First, I will introduce the study of atomic and nano-scale deformations in two-dimensional lateral heterojunctions. By developing new TEM techniques, we were able to uncover the fundamental strain relaxation mechanism in epitaxial 2D lateral heterojunctions, where misfit dislocations, ripples, and 1D channels presented here are novel in 2D materials. In addition, 2D materials, such as graphene, were able to assist the structural study of proteins in cryo-electron microscopy (cryo-EM). Using graphene covered cryo-EM grids, we successfully determined the highest resolution structure of the smallest protein via single-particle cryo-EM. The results also paved the way for new studies of nano-bio interfaces using cryo-EM



Short Bio: Dr. Han is an assistant professor of Materials Science and NanoEngineering. She received her B.S. in Physics from Tsinghua University and Ph.D. in Applied Physics from Cornell with Prof. David Muller. Her research focused on electron microscopy and the characterization of nanomaterials. After graduating from Cornell University, she joined Prof. Nieng Yan's group in the Department of Molecular Biology at Princeton University to expand her

knowledge on cryo-EM, as well as develop ways to utilize nanomaterials in biological characterization. Dr. Han started her own lab in the Department of Materials Science and NanoEngineering at Rice University in July 2020. Her group has a focus on developing novel TEM techniques to investigate nanomaterials and nano-bio interfaces.

Please contact Dr. Francisco Robles Hernandez <fcrobles@Central.UH.EDU> or Jiming Bao (jbao@uh.edu) if you want to meet with the speaker.