Electrical & Computer Engineering

S E M I N A R

Louisiana State University

Quest for novel quantum materials and devices

Brian Kim

Columbia University

Abstract—Quantum materials host exotic states of matter with unique macroscopic phenomena, ranging from various correlated electron states to topological orders. The ability to create and manipulate their emergent properties with nanoscale precision is the key in driving the future progress of new electronic, photonic and quantum technologies. In particular, 2D van der Waals (vdW) materials combined with complex transition-metal oxides exhibiting strong electron correlations open up exciting opportunities for designing new functional properties at their interface. In this talk, I will discuss a robust strategy to design novel photonic device platforms by integrating oxides into 2D materials using the notion of oxidation-activated charge transfer. Taking graphene as a model 2D system, I will describe applications of this strategy in controlling the propagation of polaritons—hybrid light-matter excitations with extreme light confinement—and in implementing low-loss nanostructured optical elements. I will further discuss future prospects of 2D/oxide heterostructures in next-generation device applications.

Bio—Dr. Brian Kim received his B.S. degree in Electrical Engineering at Northwestern University. He went onto receive M.S. and Ph.D. in Electrical Engineering at Stanford University and worked with Prof. Harold Hwang on complex oxide heterostructures and devices. He is currently a post-doctoral researcher at Columbia University working with Prof. James Hone and Prof. Dmitri Basov on 2D materials and near-field nano-optics. He is interested in creating and controlling emergent properties at the interface of 2D materials and oxides.

When: Monday, **27 February 2023,** 11:30 - 12:30
Where: Room 3316E Patrick F. Taylor Hall
Info: `https://www.lsu.edu/eng/ece/seminar`