

Michigan State University
Science at the Edge
Engineering Seminar

November 13th, 2015

11:30 a.m., Room 1400 Biomedical and Physical Sciences Building
Refreshments served at 11:15 a.m.

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2D Semiconductor Electronics: Advances, Challenges and Opportunities

Abstract

Two-dimensional (2-D) semiconductors exhibit excellent device characteristics, as well as novel optical, electrical, and optoelectronic characteristics. In this talk, I will present our recent advancements in defect passivation, contact engineering, surface charge transfer doping, and heterostructure devices of layered chalcogenides. We have developed a defect repair/passivation technique that allows for observation of near-unity quantum yield in monolayer MoS₂. The work presents the first demonstration of an optoelectronically perfect monolayer. Forming Ohmic contacts for both electrons and holes is necessary in order to exploit the performance limits of enabled devices while shedding light on the intrinsic properties of a material system. In this regard, we have developed different strategies, including the use of surface charge transfer doping at the contacts to thin down the Schottky barriers, thereby, enabling efficient injection of electrons or holes. We have been able to show high performance n- and p-FETs with various 2D materials. Additionally, I will discuss the use of layered chalcogenides for various heterostructure device applications, exploiting charge transfer at the van der Waals heterointerfaces. I will also present progress towards achieving tunnel transistors using layered semiconductors.

For further information please contact Prof. Richard Lunt, Department of Chemical Engineering and Materials Science at
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Persons with disabilities have the right to request and receive reasonable accommodation. Please call the Department of Chemical Engineering and Materials Science at 355-5135 at least one day prior to the seminar; requests received after this date will be met when possible.