MAR14-2013-020077

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Disorder in 2D Materials

MANISH CHHOWALLA, Rutgers University

Heterogeneity and aperiodicity in materials is typically viewed as undesirable but recent developments have shown that disorder in materials can lead to interesting and unexpected effects and that disorder and defect engineering are fundamental pathways for tailoring material properties. Towards this end, we utilize chemically exfoliated two-dimensional materials as model systems to study disorder. Chemical exfoliation leads to highly modified materials that are structurally and chemically heterogeneous, unlike the structurally pristine material obtained by mechanical exfoliation or chemical vapor deposition. In this talk, I will describe how several different structural phases with disparate properties in transition metal dichalcogenide (TMD) nanosheets such as MoS_2 and WS_2 are possible and how their concentrations can be controlled. I will also demonstrate metal-semiconductor transition in 2D material by phase transformation and how the metallic phase of 2D TMDs can be used to improve their catalytic activity for making hydrogen.