TSAPS plenary speaker

Dr. Talat S. Rahman, Pegasus and Distinguished Professor of Physics
University of Central Florida, Orlando, Florida

Functionalized 2D Materials for a Sustainable Future

In the pursuit for a sustainable future, the last decade has seen a concerted effort in accelerating the discovery of materials for energy needs, thanks to a large extent to the Obama Administration's Materials Genome Initiative (MGI). After some reflections on how this initiative has led to a paradigm shift in our research methodology, and how progress on this front has naturally embraced the intertwining of theoretical and experimental research, I will focus on a few materials which have captured the imagination of scientists worldwide. As with graphene, a single sheet of carbon atoms exfoliated from graphite, a common lubricant molybdenum disulphide (MoS_2) has shown remarkable optical properties when peeled off as single sheet consisting of a layer of molybdenum atoms sandwiched between two layers of sulfur atoms. Perhaps even more appealing is a layer of boron and nitrogen atoms on a hexagonal lattice (*h*-BN), emanating from another old rugged material, that could serve as a single photon emitter (for possible applications in quantum computing) or as a catalyst for sequestration and conversion of carbon dioxide to value added products such as methanol and formic acid, with efficacy comparable to that of the expensive transition metal, platinum. I will present some results from our work that provides a framework for manipulating the functionality of these interesting two-dimensional materials for industrial applications.