MAR16-2015-030154

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Materials Science and Engineering with Two-dimensional Atomic Layers

PULICKEL M. AJAYAN, Rice University

There has been tremendous interest in recent years to study two-dimensional atomic layers which form building blocks of many bulk layered materials and devices. This talk will focus on the materials science aspects of 2D atomic layer, in particular the emerging structures based on transition metal chalcogenides. Several aspects that include synthesis, characterization and device fabrication will be explored with the objective of achieving all 2D functional structures for future technologies. The concept of nanoscale engineering and the goal of creating new artificially stacked van der Waals solids will be discussed through a number of examples. The challenges involved in scalable synthesis, doping, defect engineering, surface modifications of monolayers and the controlled creation of stacked structures and in-plane junctions from multiple compositions will be discussed. Some of anticipated applications of these materials will also be discussed.