Carbon nanotube- MoS2 p-n junction: Fabrication and transport properties

UDAI BHANU, MUHAMMAD ISLAM, SAIFUL KHONDAKER, Department of Physics, Nanoscience Technology Center, University of Central Florida — Integrating two different nanoscale semiconductors of opposite carrier types are of great interest for many electronic and optical applications. Few layers molybdenum disulfide (MoS2) is an n-type semiconductor while semiconducting single walled carbon nanotubes (SWNT) show p-type behavior. In this work, we demonstrate a simple technique for integrating these two semiconductors for fabricating a p-n junction. Few layers MoS2 device were mechanically exfoliated from a single crystal of MoS2 and making electrical contact via electron beam lithography. Another pair of electrodes, which are orthogonal to MoS2 device, is deposited and semiconducting reach SWNT(s-SWNT) solution was dielectrophoretically assembled between the second pair of electrodes. The s-SWNT goes over the MoS2 and fabricates two p-n junctions. We will discuss the electronic transport properties of the fabricated devices.