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Mechanical and Electrostatic Properties of Freestanding Graphene Functionalized With Tin Oxide (SnO_2)[1] MATTHEW ACKERMAN, PENG XU, STEVEN BARBER, KEVIN SCHOELZ, DEJUN QI, PAUL THIBADO, University of Arkansas, LIFENG DONG, JAMES HANSEN, Missouri State University — Polymer/graphene blends have shown promise for building inexpensive and efficient heterojunction solar cells. It has been shown that efficiencies can be enhanced if the graphene membrane is functionalized by n-type inorganic nanocrystals, but it has proved difficult to directly chemically modify graphene. In this talk we present for the first time a two-step solution based technique which directly and uniformly deposits SnO_2 nanoparticles onto a graphene membrane. Films are characterized using X-ray energy dispersive spectrometry (EDS) and field emission scanning electron microscopy (FESEM) to determine elemental composition and density of coverage. A novel technique known as electrostatic manipulation scanning tunneling microscopy (EM-STM) is employed to characterize the affect of the nanoparticles on the mechanical and electrostatic properties of the functionalized graphene relative to pristine membranes. Evidence is presented that during the deposition stage graphene wraps around and encapsulates the nanoparticles.

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