

# Local Electrical Characterizations of Nanomaterials and Nanodevices with Scanning Probe Microscopy

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Scanning probe microscopy (SPM) has been an invaluable tool in the investigation of local characteristics of nanomaterials and devices. SPM can be used to investigate not only the surface topography but also the local electrical properties of nanomaterials and devices with such techniques as electrostatic force microscopy (EFM) and scanning gate microscopy (SGM). In this talk, I will present how we can probe local electrical properties of nanomaterials such as carbon nanotubes (CNTs) and graphene using SPM-based characterization techniques. I will present a few examples where SPM is utilized to provide information about local electrical characteristics such as voltage profiles and potential landscapes of CNT-based nanoelectronic devices. Variations and evolution of local conductance in graphene oxide films as they are reduced are also studied with SPM. These local electrical measurements can provide complementary information to traditional transport measurements. Our results mostly demonstrate significant inhomogeneities and variations of electrical properties in nanomaterials and devices which cannot be generally observed with bulk measurements.