Abstract:
In this talk I will present results from various semiconductor materials of the measurement of local carrier transport using scanning probe microscopy, and I will discuss how such measurements might be used for studying epitaxial graphene on silicon carbide. Tunneling spectroscopy with a single probe-tip provides an effective means of measuring density-of-states in materials, with the tunnel current, in most cases, being limited by transport through the vacuum barrier. However, when the transport in the semiconductor becomes comparable to that of the vacuum barrier (≈ 1 Gohm), significant effects in the observed spectra occur, allowing the mobility of the material to be deduced. Examples will be provided for SiC surfaces and for pentacene films on SiC. More sensitive measurements are possible using multiple probes, in a potentiometry arrangement, as will be illustrated for the case of bismuth films on InP. For the case of epitaxial graphene on SiC, progress over the past few years has enabled the formation of single or multiple monolayer films, although the crystallographic domain size in the films is still not well characterized. The electronic effects on of such grain boundaries can possibly be probed using the potentiometric methods described in the talk.

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