Abstract Submitted
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Electrostatic Gating in Carbon Nanotube (CNT) Networks Using Scanning Gate Microscopy[1] SAVANNAH SILVA, MARISSA DIERKES, California Polytechnic State University , ERICA HAPPE, NATALIE PLANK, Victoria University of Wellington , COLLEEN MARLOW, California Polytechnic State University — Carbon Nanotube (CNT) field effect transistor aptasensors show promise for biosensing applications because of their sensitivity to electrical changes in the environment at the molecular level. Previous work using a biased atomic force microscope (AFM) tip to electrostatically gate specific locations in the network demonstrated that individual metallic-semiconducting junctions were sensing hotspots. To better understand the role of these junctions within the context of the entire network morphology, we created a scanning gate microscopy setup using a conductive AFM tip as a movable, localized gate and an electronic measurement system to track the network current. The change in device current is measured using a multichannel lock-in amplifier as the conductive tip of fixed bias and height is scanned over the network. The resulting data reflects the response of the network to specific network locations being gated. We combine the conductance data with the topographic AFM image to create a conductive map which can reveal regions of higher network sensitivity. We have successfully created a scanning gate microscopy system at Cal Poly making it possible to map the electrical sensitivity across the entire CNT network to localized gating.

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