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Environmental Charge Noise in Suspended Carbon Nanotube Biosensors TAL SHARF, Oregon State University, JOSHUA W. KEVEK, Cornell University, ETHAN D. MINOT, Oregon State University — Carbon nanotube field effect transistors (CNT FETs) are a promising platform for probing biological systems at nanometer length scales. The sensitivity of a CNT FET sensor is ultimately limited by intrinsic fluctuations in the conductance of the sensor. Our work aims to understand the mechanisms responsible for these conductance fluctuations, and therefore understand the fundamental detection limits of charge-sensitive biosensors. We have measured conductance fluctuations in both surface-bound CNTs and suspended CNTs. Experiments are performed in physiological buffers – the typical environment for real-time biosensing. We compare our measurements to a charge noise model and the Hooge model. We find good agreement with the charge noise model, and find that charge noise is reduced by 10 –fold when CNTs are suspended rather than surface-bound. By measuring conductance fluctuations in a variety of liquid buffers we uncover new clues about the origins of charge noise in electrolyte environments.

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