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Vapor Sensors Using Olfactory Proteins Coupled to Carbon Nanotubes MITCHELL LERNER, BRETT GOLDSMITH, University of Pennsylvania, Department of Physics and Astronomy, JOE MITALA, BOHDANA DISCHER, University of Pennsylvania, Department of Biochemistry and Biophysics, A.T. CHARLIE JOHNSON, University of Pennsylvania, Department of Physics and Astronomy
— We have constructed bio-nano devices which combine mammalian olfactory proteins with carbon nanotubes to create a new class of vapor sensors. Olfactory proteins are a specific class of G-protein coupled receptors, and require a cell membrane or similar environment for proper function. Functionalization procedures have been developed to meet the challenges of routinely coupling such membrane proteins to nanotubes, while preserving the function of the protein. We have successfully isolated olfactory proteins and attached them to carbon nanotube transistors, which provide fast, all-electronic readout of analyte binding by the olfactory receptor. Several different olfactory proteins have been tested, each showing a different sensing response. This work opens the way for future coupling of biology to nanoelectronics and improved biomimetic chemical sensing. This work is supported by the DARPA RealNose Project and the Nano/Bio Interface Center

Mitchell Lerner
University of Pennsylvania, Department of Physics and Astronomy

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