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Molecular Detection with Self-Assembled Gold Nanoparticle Wires J.B. HUTCHISON, George Washington University, J.A. HOFFMANN, George Washington University, J.W. SUN, George Washington University, M.E. REEVES, George Washington University — Recently, we have reported the creation of gold nanowires by evaporation-driven vertical colloidal deposition (VCD) of gold nanoparticles. Subsequently, we have noted systematic changes in conductivity associated with post-deposition annealing. Here we describe the change in room temperature conductivity of gold nanoparticle wires after exposure to thiol-derivatized molecules. A self-assembled gold nanoparticle wire is immersed into a solution of octadecanethiol (ODT) dissolved in ethanol. An ODT molecule comprises a sulfur atom and a short hydrocarbon chain. The sulfur atoms form metallic bonds with the conduction electrons on the surface of the gold nanoparticles, and the high surface to volume ratio of the wire allows us to see a marked jump in resistance. We have seen roughly a 10 percent increase in the resistance of previously annealed wires when immersed in 2 millimolar ODT solution. Further experiments include measurement of resistance as a function of thiol-concentration and as a function of wire preparation prior to immersion.

Jaime Hutchison
George Washington University

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