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Gold Nanorod/Single-Wall Carbon Nanotube Heterojunctions Formed Directly on Surfaces ROMANEH JALILIAN, University of Louisville, Department of Physics, ANETA MIESZAWSKA, FRANCIS ZAMBORINI. , University of Louisville, Department of Chemistry, GAMINI SUMANASEKERA, University of Louisville, Department of Physics — In this presentation we describe work on the formation of heterojunctions between single-wall carbon nanotubes (SWNTs) and one-dimensional (1D) gold nanorods (AuNRs) assembled directly on surfaces. The chemical procedure is a simple benchtop method using commercially available reagents. Au NRs are grown directly and selectively on surface-attached SWCNTs by depositing hexanethiolate-terminated Au monolayer protected clusters (MPCs) on the SWCNTs and growing Au MPCs into NRs by seed-mediated growth, involving reduction of $AuCL_4^-$ onto Au MPCs in the presence of cetyltrimethylammonium bromide (CTAB). UV-vis, AFM, and SEM show highly selective growth of Au on SWCNTs only. Different combinations of junctions are possible, including AuNRs connecting two CNTs or two AuNRs attached to one CNT. We also show that Au nanostructures enhance Raman scattering of SWNTs. Several NRs and CNTs integrated into a connected assembly were studied. Electrical measurements with contacts on the AuNRs of these heterostructures will be presented. Finally carbon-supported metal structures with unique size and shape may be useful in electrocatalysis or electrochemical sensing applications.

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