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Hydrogen sensing properties of palladium-decorated carbon nanotube circuits VAIKUNTH KHALAP, TATYANA SHEPS, ALEXANDER KANE, PHILIP COLLINS — Sensitive hydrogen gas sensors can be fabricated from carbon nanotube circuits decorated with palladium metal, and we have investigated the responsible physical mechanisms using isolated, single-walled carbon nanotubes (SWCNTs). Hydrogen sensitivity arises from two active mechanisms, neither of which is the mere adsorption of Pd onto pristine SWCNTs. The first mechanism relies on the chemical sensitivity of Schottky barriers present when semiconducting SWCNTs are contacted by metals. Pd decoration of the barrier region, or the use of pure Pd as the contact metal, produces a modest H_2 sensitivity, if any. A more sensitive mechanism involves Pd-decorated defect sites, which in both metallic and semiconducting SWNTs results in reversible conductance swings of 100%. This presentation will review the temporal dynamics and pressure dependence of both mechanisms.

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