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**Individual Single Wall Nanotubes for High Sensitivity Gas Detection** BHASKAR NAGABHIRAVA[1], SHARVIL DESAI[2], GAMINI SUMANASEKERA[2], ALEX TCHERNATINSKY[2], CHAKRAM JAYANTHI[2], SHI-YU WU[2], BRUCE ALPHENAAR[1], [1]Dept. of Electrical and Computer Engineering and [2]Dept. of Physics, University of Lousiville, Louisville, KY 40292 — We report on the influence of $O_2$ adsorption on individual SWNTs, and show that the observed sensitivity is dramatically improved as compared with SWNT thin films or ropes. SWNTs were grown on a $SiO_2$ / Si substrate using chemical vapor deposition, and individual nanotubes were located and contacted with Au/Ti electrodes. The resistance of the SWNT devices was then monitored in a sealed chamber under a number of different gas environments. We observe a two order of magnitude decrease in the resistance of a SWNT device following exposure to oxygen. This is much larger than the 10-15% decrease in the resistance that has been observed for SWNT ropes or mats. Theoretical analysis suggests that the $O_2$ molecules provide acceptor impurity states to the nanotubes, which shift the Fermi energy towards the valence band. The resulting increase in positive charge carriers leads to the observed conductance increase. We also observe that the resistance of the SWNT decreases substantially when exposed to inorganic vapors, leading to the possibility of using the nanotube device for gas sensing applications. *Supported by the NSF (DMR-0112824 and ECS-0224114), the DoE (DE-FG02-00ER45832), NASA (NCC5-571) and the US Army SMDC (W9113M-04-C-0024).*

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