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Conductometric sensor based on Individual CuO Nanowires DONGDONG LI, PAICHUN CHANG, Univ of Southern California, JUN HU, RUQIAN WU, UC Irvine, JIA G. LU, Univ of Southern California — CuO nanowires with diameters ranging from 30 to 100 nm are synthesized via a simple thermal oxidation method. High resolution transmission electron microscopy shows that the CuO nanowires have monoclinic crystalline structure. The charge conduction on individual nanowire under transverse electric field exhibits an intrinsic p-type semiconducting behavior. The conductivity, charge concentration, and field effect mobility are estimated to be $\sim$1.1 x 10^{-3} S/cm, 8.3x10^{19} cm^{-3}, and 2.7x10^{-3} cm^2/Vs, respectively. Variations in the electrical conductance in different chemical gas environments (*e.g.* air, NO_2, and ethanol) are measured on individual CuO nanowire field effect transistors and compared with simulation of surface chemisorption. They show reproducible sensing response and demonstrate excellent sensitivity to the surface adsorbed chemicals. In particular, it is found that the CuO nanowire chemical sensor reveals a reversal response in ethanol vapor at a transition temperature around 300 ^{o}C. This is attributed to the redox reaction between ethanol and pre-adsorbed oxygen species on the sensor surface.

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