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Template-Grown TiO2 Single-Nanowires for Gas Sensing YAPING DAN, University of Pennsylvania, STEPHANE EVOY, University of Alberta, A. T. CHARLIE JOHNSON, Uninversity of Pennsylvania — A number of contemporary research efforts are directed towards realization of an "electronic nose" system where a sensor array is coupled to signal-conditioning electronics and sensor responses fed to odor recognition algorithms to perform detection and classification of vapors. Metal oxides thin films and nanowires are candidates for use in such systems, with the latter having performance advantages associated with their small footprint and enhanced quasi one-dimensional carrier confinement. Here we report experiments exploring the use of template-grown TiO_2 single-nanowires for gas sensing. TiO_2 nanowires were prepared by electroplating $Ti(OH)_x$ sol-gel into anodic aluminum oxide membranes and then annealing at 450 $^\circ$C for 12 h. These nanowires are typically $10\pm1\mu$m long and 100±20nm in diameter. When the temperature is elevated from 20 $^\circ$C to 200 $^\circ$C, the conductance of a single nanowire increases from 30pS to 330pS, from which an activation energy of 0.51 ± 0.02 eV is extracted. When exposed to 20% O_2at a working temperature of 200 $^\circ$C, the conductance of the wires increases by 100% within a few seconds. We will report on sensing experiments for O_2, H_2 and CO with different concentrations as well as the effects of sample annealing and working temperature. This work was supported by the National Science Foundation NIRT Grant #0303981.

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