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CO Gas Sensing with ZnO Nanowire Mat SIRISHA CHAVA, University of Idaho, DAQING ZHANG, California State University, Fresno, CHRIS BERVEN, University of Idaho — In the past decade, significant advances have been made in the synthesis of ZnO nanostructures. Here, we report the electrical properties of a gas sensor constructed from mats of ZnO nanowires grown on sapphire substrate that showed reversible response to CO exposure. The sensor is a two-terminal design, where the terminals consist of two 25 μm diameter gold wires laid parallel on the nanowire mat about $\sim$2 mm apart. The nanowires had an average diameter of 50 nm with lengths of about 10 μm. The mat was about 20 μm thick and extended over area of about 1 cm^2. When exposed to Ar, CO_2, H_2 no significant changes in the current-voltage (I-V) behavior of the mat were observed. But CO exposure resulted in a dramatic increase in electrical conductivity, with the current increasing by about a factor of four. The response was reversible after evacuation. I-V measurement of the substrate showed near zero current ($I \leq 100$ fA) under vacuum, indicating that all of the current was through the nanowires. The I-V characteristics were acquired with a source-measure unit and the bias voltage was swept over the range of -5 V to +5 V with a typical step size of 50 mV. Typical currents when exposed to CO were in the range of 40 nA.

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