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Synthesis and Electrical Transport Studies of Zn-doped Ga_2O_3 Nanowires PAI-CHUN CHANG, Z. FAN, W. TSENG, D. WANG, A. RAJAGOPAL, JIA G. LU, University of California, Irvine — Ga_2O_3 is a wideband gap material ($E_g = 4.9eV$). Its one dimensional nanostructures have attracted much research effort. Ga_2O_3 nanowire is a promising material in the applications such as blue light emitter, transparent conducting oxide, and chemical sensor. However, the electronic device application of Ga_2O_3 nanowire is difficult due to its low electrical conductivity. In this work, β-Ga_2O_3 nanowires were synthesized via catalytic chemical vapor deposition method. The diameter of the as-grown nanowires ranges from 20 to 80nm. In order to improve the electrical properties, zinc was used as a dopant. A series of material characterizations were performed to study the properties. Electron microscopy shows the morphology and crystal structure, while X-ray diffraction provides the crystal information and composition. In addition, photoluminescence spectra and photoconductivity measurements show trapping states located within the bandgap. The nanowires were also fabricated into field-effect-transistors for transport measurements. And $I-V$ and $I-V_g$ curves manifest QTRitp-type semiconducting behavior, and carrier concentration and mobility are estimated.

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