ELECTRIC FIELD EFFECTS ON THE SYNTHESIS OF ZNO NANOWIRES BY THERMAL EVAPORATION

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We present a study of the effects generated by an external electric field during the growth of ZnO nanowires synthesized by thermal evaporation. The synthesis was performed at approximately 620 °C using N₂ as carrier gas at a flow of 13 sccm. The nanowires grew between two gold electrodes deposited onto SiO₂/Si(100) substrates, and were fabricated using focused ion beam. The gold electrodes with a shape of comb teeth and separated by about 5.5 µm were polarized applying an AC bias of 25 V pp and a frequency of 3.2 MHz. SEM images revealed growth of ZnO nanowires both onto Au electrodes and between them, the latter aligned along the external electric field. The nanowires synthesized onto the Au electrodes showed an average width smaller than 110 nm, while the nanowires synthesized between the electrodes showed a width of about 400 nm. Cathodoluminescence (CL) spectra obtained the nanowires grown onto the Au electrodes showed two peaks centered at 380 and 500 nm, which correspond to the ZnO band edge emission and a defect-related emission, respectively. CL spectra the nanowires grown in the presence of the electric field revealed a CL intensity 3 times higher than that observed for the ZnO nanowires grown on the Au surface, with a weak shoulder centered at 500 nm. Current-voltage curves were obtained for voltages between 0.001V and -0.001V, and the resistivity was calculated. The device showed an Ohmic response and a resistivity of 2.269x10⁻⁵Ω·cm.

Keywords: nanowires, zno, cathodoluminescence

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