

Abstract Submitted
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Sb-doped p-type ZnO and its application on light emitting devices¹ SHENG CHU, LEELAPRASANNA J. LEELA, ZHENG YANG, JAE HONG LIM, LIN LI, JIANLIN LIU² — Reliable Sb-doped p-type ZnO on silicon substrate was grown by molecular beam epitaxy. The hole concentrations up to $10^{19}/\text{cm}^3$ were achieved by tuning the Sb cell temperature. The results from XPS and photoluminescence spectrum confirmed the theoretical prediction that the Sb doping mechanism in ZnO is the formation of complex shallow acceptor $\text{Sb}_{\text{Zn}}+2\text{V}_{\text{Zn}}$, with a low ionization energy of about 150meV. Then ZnO p-n homojunction light emitting diodes (LED) were fabricated based on the p-type Sb-doped layer, and the Ga-doped n-type ZnO layer. Low specific resistivity Au/NiO and Au/Ti contacts were deposited on top of the p-type and n-type layers, respectively, and the contacts were annealed to obtain ohmic conduction. Electroluminescence measurements were performed on the devices under different temperatures and injection currents. Strong near-band edge emissions were clearly observed at room and low temperatures. The device exhibited dominant UV peak at 3.31eV over the deep level emissions at 9K, which is the result from the large built in potential in the junction and the good film quality.

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