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Gas sensing properties and role of oxygen vacancies in Indium Oxide nanowires[1] PRADEEP GALI, FANG LING KUO, GOPAL SAPKOTA, PRATHYUSHA NUKALA, NIGEL SHEPERD, USHA PHILIPOSE, University of North Texas, USHA PHILIPOSE TEAM, NIGEL SHEPHERD COLLABORATION
— We report on the effect of oxygen vacancies on defect related emission and the electronic properties of In_2O_3 nanowires, synthesized by vapor phase transport. The as-grown nanowires connected in an FET type of configuration shows n-type conductivity, which is ascribed to the presence of oxygen vacancies in the nanowire. The resistivity, transconductance, field effect mobility and carrier concentration of the In_2O_3 nanowires were determined to be 1.82 x$10^{-2}\Omega$cm, 11.2 nS, 119 $cm^2V^{-1}s^{-1}$ and 4.89 x $10^{17}cm^{-3}$ respectively. The presence of oxygen vacancies was also confirmed by photoluminescence measurements, which show a strong U.V emission peak at 3.18 eV and defect peaks in the visible region at 2.85 eV, 2.66 eV and 2.5 eV. We present a technique of post-growth annealing in O_2 environment and passivation with $(NH_4)_2S$ to reduce the defect induced emission. A single In_2O_3 nanowire with ohmic contacts was found to be sensitive to gas molecules adsorbed on its surface.

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