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Structural, Optical and Electrical Properties of Sputtered InGaN Alloy Thin Films. MOHAMMAD EBDAAH, DANIEL HOY, JOEL VAUGHN, MARTIN KORDESCH, Ohio University, DEPARTMENT OF PHYSICS TEAM — Amorphous and polycrystalline InGaN alloy thin films were successfully fabricated using rf sputtering technique with a sputtering targets of metal In and Ga in pure Nitrogen. Films were deposited on Si and quartz substrates, with the ratio of In to Ga being varied from 0 to 1 in the alloy. Growth under different sputtering conditions has been examined, such as different temperatures, pressures, and substrate-target distances. The corresponding obtained structures have been studied using the x-ray diffraction (XRD) and transmission electron microscopy (TEM) techniques. The compositions have been verified by means of energy dispersive x-rays (EDX) spectroscopy and Rutherford back scattering (RBS). Multiple crystallographic phases have been investigated upon growth at different temperatures, and the existence of Gallium Nitride (GaN) and Indium Nitride (InN) phases were investigated. Hall effect measurements were made in 0.55 T magnetic field for characterizing the electrical resistivity at room temperature and 77 K, the free carrier concentration, and mobility. The optical bandgap and optical properties were studied by spectrophotometric and spectroscopic ellipsometric (SE) techniques.

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