

Copper Doped P-Type Nickel Oxide Transparent Conducting Oxide Thin Films

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Abstract : Nickel oxide and copper-nickel oxide thin films have been successfully deposited by reactive ion beam sputter deposition. Experimental results show that nickel oxide deposited at 300°C is single phase NiO while best crystalline quality is achieved with an O_{pf} of 0.5. XRD analysis of nickel-copper oxide deposited at 300°C shows a Ni₂O₃ like crystalline structure at low O_{pf} while changes to NiO like crystalline structure at high O_{pf} . EDS analysis shows that nickel-copper oxide deposited at low O_{pf} is Cu_xNi_{2-x}O₃ with $x = 1$, while nickel-copper oxide deposited at high O_{pf} is Cu_xNi_{1-x}O with $x = 0.5$, which is supported by Raman analysis. The bandgap of NiO is ~ 3.5 eV regardless of O_{pf} while the band gap of nickel-copper oxide decreases from 3.2 to 2.3 eV as O_{pf} reaches 1.0.

Keywords : copper, ion beam, NiO, oxide, resistivity, transparent

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