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Investigation of optical, electronic, and magnetic properties of p-type NiO thin film on different substrates

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thermal evaporation method after thermal oxidation of as-deposited 50 nm Ni film at 450 °C on sapphire, Si(100), InP, and GaAs. The structural properties of NiO films were analyzed. We observed that the Ni ions were interacted with sapphire, InP, and GaAs substrates to the sapphire, InP, and GaAs substrates, and resulted in a formation of secondary phases to determine the average film thickness that is also affected by Ni-surface interactions. The average film thickness was in the range of 300-800 nm for the NiO film on sapphire and glass samples, respectively. The band gap energy was determined by Tauc's equation and found to be 3.63 eV and 3.67 eV, respectively. NiO films on glass substrates were measured at 10 K. The magnetic field dependence of magnetization was measured at 10 K. The magnetization curves were recorded as 245 x 10(3) A/m and 2.58 mu B, respectively, for the NiO film on the sapphire and glass substrates, respectively. The magnetization curves showed a hysteresis loop with a coercive field of 0.02 T. The Curie temperature was determined to be 10 K. The Curie law was used to determine the Curie constant and the effective magnetic moment per Ni ion was found to be 1.73 mu B. The Curie law was used to determine the Curie constant and the effective magnetic moment per Ni ion was found to be 1.73 mu B. The Curie law was used to determine the Curie constant and the effective magnetic moment per Ni ion was found to be 1.73 mu B.

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