

Characteristics of Li- doped Ni-Cobalt Oxide Thin Films Prepared by PLD Process

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Extended Abstract

Highly transparent p-type transparent oxide semiconductors are essential for transparent electronic devices. In this study Li doped NiCo_2O_4 spinel oxide thin films were fabricated for p type transparent oxide semiconductor by using pulsed laser deposition. Thin films with spinel phase were grown on glass and c-sapphire single crystal substrates at various substrate temperatures. The effects of doping concentrations, substrate temperatures and oxygen partial pressure on thin film structure, electrical and optical properties of the Li-doped $(\text{Ni},\text{Co})\text{Co}_2\text{O}_4$ spinel thin films were analyzed by XRD, Hall measurements, and UV spectrometer. Electrical conductivity and optical transmittance increased with increasing substrate temperature up to 400°C . The well crystallized spinel thin films of (111) preferred orientation were grown on the sapphire substrate above 200°C . Oxygen partial pressure was critical processing factor for spinel phase formation as well as optical transmittance and electrical conductivity. When oxygen partial pressures was lower than 5mtorr, rock salt type $(\text{Ni},\text{Co})\text{O}$ phases were more favourable and electrical conductivity decreased very sharply. Li doped $(\text{Ni},\text{Co})\text{Co}_2\text{O}_4$ spinel thin films with electrical conductivity of 30 S/cm and optical transmittance about 60% were fabricated with optimum processing parameters. In this study, the influences of various processing parameters on the characteristics of Li doped $(\text{Ni},\text{Co})\text{Co}_2\text{O}_4$ spinel thin films were discussed.

Facchetti, A. (2009). *Transparent Electronics*, Wiley.