

Interfacial and electrical properties of solution processed Ni-doped p-Type TiO₂ in bipolar and transistor devices

Soumen Das, 김진환, 최한석, 박용규, Da-an Liu, 한운봉*
전북대학교
(ybhahn@jbnu.ac.kr*)

Interfacial and electrical properties of Ni²⁺-doped TiO₂ thin films were studied. X-ray photoelectron spectroscopy (XPS) indicated the influence of Zn²⁺ ions on the local chemical environment of Ti atoms. The p-type conductivity of the Ni²⁺:TiO₂ was confirmed from the current-voltage relations of Ag/ZnO/Ni²⁺:TiO₂ bipolar and Ag/ZnO/NiO/Ni²⁺:TiO₂/Si field effect transistor (FET) devices. The performance of FET was examined as a function of temperature and evaluated in terms of mobility (μ), hole diffusion coefficient (D_h) and sub-threshold swing (SS). The μ and D_h were 0.1–2.9 cm²V⁻¹s⁻¹ and 10⁻³–10⁻¹ cm²s⁻¹, respectively and SS was comparable to a back-gated silicon nanowire FET at around 370–680 mV per decade.