

Structural and optical properties of ZnO:MgO films prepared by sol-gel spin coating process

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In this study, ZnO:MgO films were deposited on glass substrates by sol-gel spin coating process from MgO-0at% to MgO-100at%. The samples were prepared at 500°C for 1 hour in air to study the effect of MgO content on the structural and optical properties. Room-temperature photoluminescence (PL) properties of ZnO:MgO films were studied. It was found that within the low MgO content region the visible luminescence increased with increasing MgO. It can be applied for white light emitting diode. In some regions having middle MgO content, a remarkable change in the photoluminescence spectra of ZnO:MgO was observed. Highly intense excitonic emission at room temperature was obtained by dielectric confinement effect. Field emission scanning electron microscopy (FE-SEM) characterizations show that the MgO was segregated in circle form in ZnO at 30at% MgO content. These results will provide new insight into the effect of MgO on ZnO.

Keywords: ZnO, MgO, photoluminescence

Electrical and optical properties of ZnO thin films prepared by rf-magnetron sputtering at various oxygen flows

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Recently, ZnO film has drawn great deal of attention for electrical and optical application due to its excellent properties. However, it has been more required that electrical and optical devices should have structural stabilities. In this study, ZnO films were prepared by rf-magnetron sputtering using Zn target and were controlled to have nonstoichiometric forms in order to observe the electrical and optical property changes. It was found that the electrical properties of the films heavily depend on its carrier concentration and mobility changes were small. From the UV visible spectrophotometer measurement, transmittance of ZnO films increase with increasing oxygen content, together with increase of the oxygen vacancy. Photoluminescence measurement shows that the Zn vacancy has a strong emission at room-temperature. X-ray diffraction (XRD) analysis shows the increase in peak intensity after annealing process and ZnO film has polycrystalline structure at low oxygen content.

Keywords: ZnO, Photoluminescence, Hall measurement