QD-LED용 무기계 홀전도층 NiO 박막 증착 연구

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Depositon of NiO films for Inorganic Hole-transporting Layer in QD-LED

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Abstract : For the high-performance Quantum dots-Light Emitting Diodes in the near-infrared and visible spectrum, adequate electro- and hole-transporting layers are required. The operation lifetimes of typical materials used in OLEDs are very limited and degraded especially by the oxygen and humid atmosphere. In this work, NiO was selected as a possible hole-transporting layer replacing the TPD film used in QD-LEDs. About 40-nm-thick NiO films have been deposited by the rf-sputtering method on various technical substrates such as FTO/glass, ITO/glass, and ITO/PEN. For the balance of charge carriers and quenching consideration, the resistivity of the deposited NiO films was investigated controlling the oxygen in the sputtering gas. NiO films were fabricated at room temperature and about 6mTorr using pure Ar, 2.5%-, 5%-, and 10%-mixed O_2 in Ar respectively. We also investigated the rf-power dependence on NiO films in the range of 80 ~ 200 Watts. The resistivity of the samples was varied from highly conductive to resistive state. Also discussed are the surface roughness of NiO films to provide the smooth surface for the deposition of QDs.

Key Words : Quantum dots, Light emitting diode, NiO, hole transporting layer

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