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DC 마그네트론 스퍼터링 법으로 증착한 ZnO:Al 박막의 방전전력 영향에
따른 특성 연구

Influence of discharge power on the properties of ZnO:Al films deposited by
dc magnetron sputtering

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Transparent conductive oxide (TCO) films, mainly indium tin oxide (ITO) films, have been widely applied to manufacture transparent electrodes for flat panel displays, solar cells, organic light-emitting diodes, integrated optics, piezoelectronic, gas sensor, heat mirror and surface acoustic wave (SAW) devices due to the high luminous transmittance, good electrical conductivity, good adhesion to substrate and chemical inertness. However, high cost of ITO has motivated efforts to develop substitutes. In particular, ZnO film doped with Al, an n-type dopant, has attracted attention as TCO because of its low resistance and high transparency to visible lights. ZnO-based TCOs are relatively inexpensive and they also have desirable properties such as nontoxicity, long-term environmental stability and excellent IR shielding.

Al-doped ZnO (ZnO:Al) thin films were grown on Corning 1737 glass substrates by dc magnetron sputtering. The structural, electrical and optical properties of the films were investigated as a function of various discharge power.

The obtained films were polycrystalline with a hexagonal wurtzite structure and preferentially oriented in the (002) crystallographic direction. The lowest resistivity is $6.0 \times 10^{-4} \Omega \text{cm}$ with the carrier concentration of $2.694 \times 10^{20} \text{cm}^{-3}$ and Hall mobility of $20.426 \text{cm}^2/\text{Vs}$. The average transmittance in the visible range was above 90%. The more result will be presented in the meeting.