

Magnetron sputtering을 이용한 ITO/Ni/ITO 박막의 전기광학적 특성 연구

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The optoelectrical properties of ITO/Ni/ITO films prepared with a magnetron sputtering

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Abstract : Transparent and conducting indium tin oxide (ITO) and ITO/Nickel/ITO(INI) multilayered films were prepared on glass substrates by a magnetron sputtering without intentional substrate heating. The RF(13.56MHz) and DC power were applied to ITO and Nickel target, respectively. The thickness of ITO, Ni and ITO films were kept constantly at 50, 5 and 45 nm. In order to consider the effect of post deposition vacuum annealing in vacuum on the physical and optoelectrical properties of INI films, optical transmittance, electrical resistivity, crystallinity of the films were analyzed. From the observed result, it may conclude that the optoelectrical properties of the INI films were dependent on the post deposition annealing. For the INI films annealed at 300°C, the films have a polycrystalline structure with (110), (200), (210), (211) and (300). The resistivity of the films were $4.0 \times 10^{-4} \Omega\text{cm}$ at room temperature. As the annealing(300°C), resistivity decreased to $2.8 \times 10^{-4} \Omega\text{cm}$. And also the optical transmittance decreased from 79 to 70 % at 550nm.

Key Words : Indium tin oxide, Nickel, Sputtering, Multilayer, Annealing

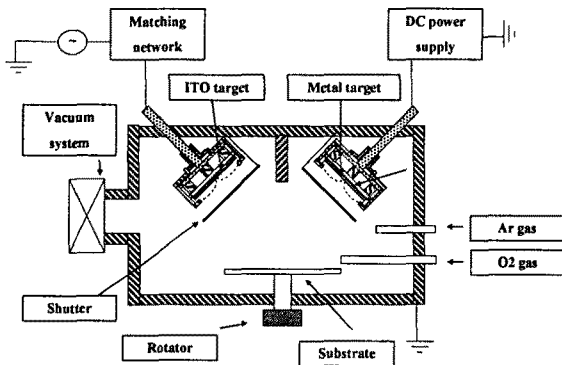


Fig. 1. A Schematic diagram of RF & DC magnetron-sputtering system

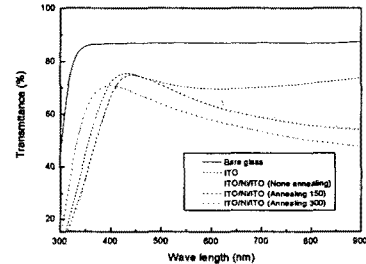


Fig. 2. Optical transmittance of ITO (100 nm) and ITO/Ni/ITO films

Table. 1. Comparison of optical transmittance, resistivity and figure of merit of ITO and ITO/Ni/ITO films

	Sample	Transmittance (%) at 550 nm	Resistivity ($\times 10^{-4} \Omega\text{cm}$)	Figure of merit ($\times 10^{-4} \Omega^{-1}$)
as deposited	ITO	81	22.2	5.4
	ITO/Ni/ITO	79	4.0	23.8
as annealed	ITO/Ni/ITO(150°C)	77	3.6	20.4
	ITO/Ni/ITO(300°C)	70	2.8	10.0