

RF-Manetron Sputtering에 의한 촉매금속 박막 증착 및 nanoparticle의 제어

김남철†, 백기종, 소병문, 문상진

공주대학교 신소재공학부
(nckim@kongju.ac.kr†)

PE-CVD(플라즈마 화학기상증착법)은 CNT를 합성할 때, 촉매금속 위에 성장시키는 것으로 잘 알려져 있다. 촉매금속으로 보통 Ni, Co, Fe등이 사용된다. 본 실험에서는 Ni, Co을 사용하였으며, RF-Manetron Sputtering을 이용하여 5.0×10^{-6} Torr이하의 진공도를 초기진공으로 Ar기체를 주입하여 3.0×10^{-3} Torr로 압력을 일정하게 조절한 분위기에서 50nm이하의 두께로 증착하였으며, 열처리를 시행하여 nanoparticle을 형성시켰다.

본 실험에 쓰인 기판은 Si/SiO₂(1000Å)을 사용하였고, 열처리는 600°C ~ 900°C에서 10 ~ 60분 동안 시행하였으며, 분위기 가스로는 H₂가스를 사용하였다. SEM을 이용하여 박막의 표면과 단면을 분석하였으며, AFM을 이용하여 박막 표면의 거칠기 등을 조사하였다. 열처리 온도와 시간에 따라 입자의 밀도, 크기가 변화됨을 알 수 있었다.

Keyword: DC-Sputtering, Catalytic Metal, CNT, Ni,

Effects of indium concentration in the indium zinc oxide (IZO) channel layer on the electrical performance of IZO-based TFTs

문연건†, 문대용, 이상호, 정창오*, 박종완

한양대학교 신소재공학과; *삼성전자 LCD총괄
(opendoor79@hanyang.ac.kr†)

ZnO has been studied as a semiconducting material and has attracted attention due to improvements in deposition techniques that have made it possible to make high-quality ZnO thin films. We report the fabrication and characteristics of thin film transistors with indium zinc oxide (IZO) channel layers having different indium concentrations. Also, we define the operation mechanism of IZO-based TFTs as the variation of indium concentration of the IZO channel layer. The IZO thin films were deposited on SiO₂/p-Si substrate using indium oxide pellet and ZnO target by DC magnetron sputtering.

The structural, electrical, and chemi-physical properties of intrinsic IZO thin films were characterized using various analysis tools. A high-resolution X-ray diffractometer (HR-XRD, Bruker Discover) was used to investigate the crystallinity and crystal orientation. The electrical properties of films including carrier concentration, carrier mobility, and resistivity were measured using a Hall Effect system (Ecopia, HMS-3000). The elemental composition in the films was investigated by Rutherford back scattering (RBS, NEC 53DH-2)

Effects of indium concentration in the IZO thin films on the electrical performance of IZO-based TFTs with bottom gate structure were investigated using HP4145B semiconductor parameters analyzer. Our research implied that an attractive application for TFTs involves their use as select-transistors in individual pixels of an active-matrix liquid-crystal display.

Keywords: zinc oxide, thin film transistor