P-113

Adsorbate Perspective of the Field Emission Behaviour of ZnO Nanoneedle Arrays

왕린, 최희규*, 정민창**, 명재민***, 이웅†

창원대학교 금속재료공학과; *창원대학교 나노신소재공학부; **LG Philips LCD; ***연세대학교
(woonglee@changwon.ac.kr†)

ZnO nanoneedle arrays were formed on ZnO:Al/Pt/Si (001) conductive substrate by catalyst-free MOCVD and prototype test cells based on transparent conductive electrodes were prepared for the investigation of the field emission (FE) characteristics of ZnO 1-D nanostructures. It was possible to obtain well-aligned vertical array of high quality ZnO nanoneedles on a Si (001) substrate by depositing an Al-doped ZnO buffer layer on it to provide a seamless interface as well as an electric conduction path to the nanoneedle field emitters. Measurements of the FE characteristics on the as-fabricated and the UV-treated ZnO nanoneedles showed that FE behaviour of the nanoneedles is dependent on the UV-treatment. Such observations are attributed to the changes in the surface states due to adsorption and desorption of the oxygen related adsorbates on the surface of the ZnO nanoneedles. It is suggested that modifications in the tunnelling barrier height or apparent work function and the effective aspect ratio due to the presence of surface adsorbate are responsible for the changes in the measured FE characteristics. Desorption of the surface species driven by the combination of negatively charged adsorbed oxygen species on the nanoneedle surface with holes created by the UV irradiation seemed to have resulted in the stabilised FE behaviour of the ZnO nanoneedles.

Keywords: ZnO nanoneedle, field emission, adsorbate

P-114

Understanding of dry etching of polycarbonate based on O_2 plasmas

주영우, 박연현, 노호섭, 김재권, 이성현, 조관식, 송한정, 이제원†

인제대학교 나노공학부, 나노매뉴팩처링 연구소
(jwlee@inje.ac.kr†)

Polymer is one of attractive materials for bio, optical MEMS devises. One of them , polycarbonate(PC), is interested in device cause low cost, light weight and high transparency. However, there has been a few reports for dry etching of polycarbonate. So we studied O_2 plasma etching with the addition of N_2, SF_6 and CH_4, respectively, on polycarbonate using a reactive ion etching system. We used photo lithography process for patterning on polycarbonate. Experimental parameters were that changing composition O_2 with N_2, SF_6 and CH_4 respectively. And we changed RIE chuck power from 25W to 200W. During plasma etching process, plasma intensity was analyzed by optical emission spectroscopy for understanding of discharge intensity. After plasma etching, we also analyzed surface of polycarbonate with scanning electron microscopy (SEM), atomic force microscope (AFM) and surface spectrometer. The results showed the highest etch rate (0.56um) in $12O_2/8SF_6$ compared with others.

Keywords: RIE, Plasma etching, Polycarbonate, O2 plasmas