[III-3]

Influence of different gas concentrations on the plasma etching mechanism for amorphous silicon thin films

이 종완, 강 성구*, 김 태형, 김 차연, 김 성태

금성중앙연구소 분석실, *금성사 LCD SBU Pilot 생산실

Plasma or dry etching techniques like reactive ion etching can cause damage and contamination effects in exposed materials. Due to ion bombardment and charge buildup, damaged layers can be formed up to hundreds of Angstroms from the surface. Residue layers as one of contamination effects form a surface film in the etching process. These ultrathin layers of reaction products can interfere with subsequent etching processes. In the present work, the surfaces of amorphous silicon thin films after $CF_4/Cl_2/O_2$ plasma etching with different gas concentrations have been investigated. The morphology of the etched surface was observed with scanning electron microscopy. In order to identify the composition of the etch residues, x-ray photoelectron spectroscopy (XPS) analysis was carried out. For the Cl_2 concentration relatively low in comparison with the CF_4 concentration, the plasma etched surface showed a flat and well-etched surface. For relatively high Cl_2 concentration, however, column-like ripples have been observed at the etched surface, which means that an inhomogeneous plasma etching process has been occurred. The XPS results, however, revealed no composition difference between the two etched surfaces. This implies that the inhomogeneity of the plasma etching process is not associated with chemical contaminations at the top of the ripples. Possible plasma etching mechanism in conjunction with physical sputtering and chemical etching will be discussed.