

Changes in surface roughness and work function of indium-tin-oxide due to
KrF excimer laser irradiation

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Abstract

In this study, from the observed x-ray photoelectron spectroscopy and atomic force microscopy results, and Kelvin probe measurements, it is suggested that the induced indium-tin-oxide (ITO) surface chemical changes by KrF excimer laser irradiation had strong effects on the surface work function (SWF) and surface roughness of ITO. During the laser irradiation, the incorporation of O_2^{2-} peroxy species or the dissolution of oxygen species near the ITO surface leads to the reduction of the surface roughness and an increase in the SWF. In addition, it is worth noting that the laser-irradiated ITO sample has an excellent stability in the SWF.

Keywords : Indium compounds; Degenerate semiconductors; Surface roughness; Work function; X-ray photoelectron spectra; Atomic force microscopy; Surface chemistry; Laser beam effects; Dissolving; Laser materials processing; Surface cleaning; Excimer lasers