

Infinitely high etch selectivity of indium tin oxide (ITO) layer to photoresist during CH₄/H₂/Ar inductively coupled plasma (ICP) etching

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Indium Tin Oxide (ITO) thin film is essential for making various optoelectronic devices. ITO has found many applications including flat panel display, photovoltaic devices and organic light emitting diodes (OLED) because of the ITO's excellent electrical conductivity and high optical transmittance. In this study, the etching characteristics of ITO thin films, etched with a positive photoresist mask, and a etch process window in inductively coupled CH₄/H₂/Ar plasmas, were investigated by varying the various process parameters such as top electrode power and gas flow ratios. It was found that the etch process window for ITO etching is closely related to the balance between the deposition and removal processes of *a*-C:H (hydrogenated amorphous carbon) layer on the ITO surface. Under certain conditions, the etch rate selectivity of ITO to PR was infinite, because the ITO films continue to be etched but a net deposition of the *a*-C:H layer occurs on the top of the photoresist. Mechanism and process window of infinitely high etch selectivity of ITO to PR will be diagnosed using the Langmuir probe and radicals in the plasma using Optical Emission Spectrometry (OES).