

**Plasma-assisted ITO sol coating for optimizing the optoelectronic properties of ITO glass**

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Atmospheric pressure plasma treatment is combined with the conventional sol-gel dip-coating process for fabricating ITO thin films to improve the electrical property of the ITO glass. The increase of the surface free energy of the ITO layer by plasma treatment improves adhesion of the pre-annealed ITO layer, thereby increasing thickness of the ITO film without significantly losing the light transmittance. While increasing the plasma treatment time up to 240 s, both thickness and surface free energy of the ITO layer are increased, and the sheet resistance of the thin film is rapidly decreased. The ITO layer plasma-treated for 240 s with the thickness of 360 nm exhibits the lowest sheet resistance of 126.5  $\Omega/\text{sq}$  and the highest surface free energy of 79.45  $\text{mJ}/\text{m}^2$ . However, the increase of the plasma treatment time over 240 s do not affect the increase of film thickness, but the increase of sheet resistance. X-ray photoelectron spectroscopy depth profile reveals the decrease of the level of the oxygen vacancies with increasing plasma treatment time over 240 s. It results from the diffusion of oxygen from the surface into the bulk and explains the increase of the sheet resistance.