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Effect of the outgassed moisture from polymer substrate on the electrical properties of Indium Tin Oxide thin films

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We report the effect of the outgassed moisture depending on main roll temperature from polymer substrate on the electrical and optical properties of indium tin oxide (ITO) films prepared with roll to roll sputtering for use as transparent electrodes. The ITO films deposited with a high main roll temperature of 80 °C were found to exhibit an amorphous structure and the post-annealing process did not improve their electrical conductivity or optical transmittance. After the outgassing process was performed 6 times in the roll-to-roll sputtering chamber, the optimized sheet resistance of the ITO thin film was improved from 95 Ω/\square to 78 Ω/\square . We found that the structural and electrical properties of the ITO films are strongly dependent on the outgassed moisture during deposition.

Keywords: indium tin oxide; roll to roll sputtering; roll temperature; outgassing

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