Characterization of sputtered indium tin oxide layers as transparent contact material

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The electrical, optical, and various mechanical properties of rf sputtered indium tin oxide layers were investigated in terms of electrical resistivity (four-probe measurement and Hall), optical transparency, scanning transmission electron spectroscopy and x-ray spectroscopy. Whereas the specific conductivity is at the lower limit reported in the literature ($2\times10^{-4}\,\Omega$ cm), and the optical transparency is as high as 90% in the wavelength range between 550 and 800 nm, the grain size is between 10 and 25 nm. The stress is tensile and in the range of 7 kbar after deposition, to drop to 3 kbar after anneal. [DOI: 10.1116/1.1389901]