Single-Doped and Co-Doped SnO_2 Transparent Thin Film Electrodes

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SnO_2 doped thin films for optoelectronic applications have been prepared by sputtering from two different targets: ATO (antimony doped tin oxide) and ATZO (antimony and Zn doped tin oxide). These films have been characterized by electron probe x-ray microanalysis, x-ray photospectroscopy for the composition, x-ray diffraction, scanning electron microscopy and atomic force microscopy for the morphology and the microstructure.
The optical properties have been studied by transparency and reflectivity measurements. In the case of ATO thin film that have a metallic behavior, some calculations based on Drude model have been carried out to determine the number of charge carrier and their optical mobility. The electrical properties of the thin films have been evaluated from resistivity (four probe set-up) and hall measurements.
Best optoelectronic performance has been obtained for ATO thin film doped with 1.5% of Sb. Even if the conductivity is lower for ATZO films, the latter can be prepared with a higher deposition rate and it allows having a conductivity modulation.