Indium oxide doped with both tin and zinc (ITZO): high density with highly conducting ceramic targets for sputtering TCO thin-film electrode.

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Abstract

Indium oxide doped with tin and zinc (ITZO) ceramics have been prepared by sintering powders mixture, which is embedded in alumina crucible, at 1300 °C. This allowed us to easy fabricate large targets with high density suitable for sputtering TCO films. Without using any cold or hot pressing techniques, The ITZO ceramic reaches a high bulk density (~ 92 % of In2O3 theoretical density). XRD diagrams show a high solubility limit for Sn and Zn when they are co-doped into In2O3 forming a solid-solution. They confirm a bixbyte structure typical for In2O3 with no extra peaks that could correspond to Sn and/or Zn based oxides. A very low electrical resistivity is obtained, for [In2O3:Sn0.10]:Zn0.10 (1.7×10-3 Ω.cm, lower than ITO counterpart), due to high carrier mobility. This high mobility is correlated to the strong enhancement of the grain percolation as shown by SEM micrographs