

## The Cosubstitution Reaction of $\text{In}_2\text{O}_3$ by $\text{ZnO}$ and $\text{SnO}_2$ as Characterized with X-ray Spectroscopy

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Transparent conducting oxides (TCOs) are crucial materials to optoelectronics, such as flat-panel displays and photovoltaics, with tin-doped indium oxide (ITO) having the high electrical conductivity and optical transparency required for maximum device performance. The limited global supply of indium metal coupled with the sudden demand increase for these devices has necessitated the need to develop indium-free TCOs. The cosubstitution of  $\text{ZnO}$  and  $\text{SnO}_2$  into  $\text{In}_2\text{O}_3$  (ZITO) has demonstrated conductivities comparable to those of ITO, while reducing the percentage of In by 40 mole %.<sup>1,2</sup> The structural changes that occur in  $\text{In}_2\text{O}_3$  upon substitution with Zn and Sn have been investigated on the long-range scale with X-ray diffraction and on the short-range scale with X-ray absorption spectroscopy. [1. Chem. Mater. Vol. 9, pp. 3121 – 3126 (1997); 2. J. Am. Ceram. Soc. Vol. 91, pp. 3683 – 3689 (2008)]