X-RAY PHOTOEMISSION SPECTROSCOPY (XPS) ANALYSIS ON PLATINUM DOPED STANNIC OXIDE CERAMIC

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ABSTRACT
Pt-SnO₂ ceramics were fabricated by the dry pressing method and sintered at 1000°C. The XPS spectrum showed the Sn ⁴d, Sn ⁴p, Sn ⁴s, C ¹s, Sn ³d⁵/₂, Sn ³d³/₂, O ¹s, Sn ³p¹/² and Sn ³s peaks. The high resolution scan of revealed that the O ¹s has a binding energy of 530.2 eV which indicates that there were oxygen vacancies in the doped material. The FWHM XPS spectrum was broader than the pure SnO₂, which shows that there is a greater range of chemical environments and hence binding energies. The asymmetry in the O ¹s also shows that adsorbed oxygen exists on the surface of the sample in ambient atmosphere. The Sn ³d⁵/₂ peak was symmetric and has a small FWHM indicating that the compound has one component only. The atomic ratio of oxygen and tin (ratio of O ¹s and Sn ³d⁵/₂) is ~ 1.30 :1, a deviation of stoichiometry which was caused by oxygen deficiency on the surface region. The binding energies of both the Sn ³d⁵/₂ and Sn ³d³/₂ shifted by 0.01 eV with respect to the pure SnO₂ XPS spectrum sintered at the same temperature (1000°C) and this is an indication that the chemical environment was changing due to the incorporation of Pt in SnO₂. The Pt(2) which shows from the XPS spectrum was probably an oxide layer on the Pt metal or possibly dissolved in the SnO₂. The XPS analysis also showed that the Pt ⁴f looks like mainly Pt(0) or Pt metal.


REFERENCES