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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 1000oC. The XPS spectrum showed the Sn $_{4d}$, Sn $_{4p}$, Sn $_{4s}$, C $_{1s}$,Sn $3d_{5/2}$, Sn $3d_{3/2}$, 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 $3d_{3/2}$ shifted by 0.01 eV with respect to the pure SnO2 XPS spectrum sintered at the same temperature (1000oC) 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 4 f looks like mainly Pt(0) or Pt metal.

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