SnO2 is a semiconducting material of interest for technologically applications such as gas sensors, transparent electrical contacts or optoelectronics. Its electrical conduction is related to nonstoichiometry due to a large concentration of oxygen vacancies acting as shallow donors close to the conduction band. However, this vacancy model seems to raise few fundamental questions to the general understanding of the phenomenon of transparent conductivity. Some theoretical results point out to an important role of the Sn interstitial which presents unusual stability due to the multivalence of tin under different chemical potential conditions in SnO2.

The defect rutile structure of sintered SnO2 ceramic samples and its correlation with optical and electrical properties have been investigated. In particular, the role of oxygen vacancies and of tin interstitials in the luminescence and electrical resistivity of the sintered samples has been analyzed. Samples prepared under different thermal treatments have been characterized by the cathodoluminescence (CL) mode in a scanning electron microscope (SEM), X ray diffraction (XRD), high resolution transmission electron microscopy (HRTEM) and by electrical resistivity measurements.