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EFFECT OF Y AND Dy CO-DOPING ON ELECTRICAL CONDUCTIVITY OF CERIA CERAMICS

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The effect of co-joint additions of Y and Dy on electrical conductivity of ceria ceramics was studied by impedance spectroscopy measurements. Powder materials were synthesized by aqueous coprecipitation method to obtain Ce_{1-x} $(Y_{0.5}Dy_{0.5})_xO_y$ with $0 \leq x \leq 0.15$. Sintering of powder compacts was carried out at 1450 ºC for 4 h. The main results show that high densification (~ 95% of theoretical value) was attained for all compositions. Raman spectroscopy results evidenced the solid solution formation among cerium, yttrium and dysprosium. The electrical conductivity of sintered specimens varies with the total dopant content. A maximum conductivity value was obtained for a lower dopant content considering the behaviour of singly doped ceramics. Moreover, sintered specimens with the same total dopant content exhibit similar electrical conductivity values suggesting that the concentration of oxygen vacancies play a major role in the conduction process of co-doped ceramics.

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CORRELATION BETWEEN MICROSTRUCTURE AND ELECTRIC PROPERTIES IN SnO_2 RICH ENAMELS

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Nowadays, electric properties of SnO_2 are widely studied and known due to its applications as a gas sensor or as a film for transparent electrodes. Although stoichiometric SnO_2 is an insulator it's possible to increase its conductivity and make it a semiconductor when there is a deviation from stoichiometry by the presence of oxygen vacancies in its structure (SnO_{2-x})or by the introduction of other dopant agents
In this work, SnO_2 has been used as a fundamental part in the formulation and development of conductive ceramic enamels, increasing the stoichiometric deviation with the introduction of dopants as Sb(V). Moreover, the effect of the amount of dopants on the electrical properties and the effect of the enamel composition have been studied
Synthesized enamels have been structural and microstructurally characterized and a study of their electrical properties has been carried out by impedance spectroscopy and the measurement of I-V characteristic. Therefore, electric properties have been related to the microstructure in the samples and activation energy of the different involved processes has been calculated. Finally a model for the system has been obtained where the different zones of composition and doping with a significant contribution in the electrical properties have been assigned.
In order to separate the different contributions by impedance spectroscopy, high and low frequency measurements have been done in a range of temperature between 180 K and 480 K. In addition, due to the strong dependence of SnO_{2-x} conductivity on oxygen vacancies, measurements al different O_2 partial pressure have been carried out.