

Porous ceramic applied as catalytic support for SrSnO₃ for NO reduction

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Abstract – Porous ceramics were applied as catalytic supports for SrSnO₃. Impregnation of SrSnO₃ was done using a resin prepared by the polymeric precursor method. After calcination at 700 °C, samples were characterized by X-Ray Diffraction (XRD), Scanning Electronic Microscopy (SEM) and Infrared Spectroscopy (IR). A high adhesion of the catalyst on the support was observed by SEM, with crystalline perovskite obtained after calcination at 700 °C. Dislocation of IR bands indicates the high interaction between catalyst and support. This material can be applied in the NO reduction in CO presence.

Porous ceramic are reticulated structures that can be obtained by the impregnation of a polymeric sponge [1]. Properties as permeability and cell structure depend on the characteristics of the sponge. In this work, these highly porous materials were applied as catalytic supports for perovskite, known by its interesting catalytic properties. More specifically, SrSnO₃ doped with nickel was impregnated on the porous ceramic, due to its catalytic activity in NO reduction in the presence of CO [2].

In the present work, the porous ceramic was used as catalytic support, being obtained by the polymeric sponge impregnation with natural raw materials (feldspar, quartz and kaolinite). Impregnation of the SrSnO₃ was done using the polymeric resin obtained by the polymeric precursor method. The porous ceramic was impregnated for 12 h in the SrSnO₃ resin, with 6 cP of viscosity, dried in air, calcined in O₂ at 300 °C for 12 h and in air at 700 °C for 4 h. The porous ceramics with and without SrSnO₃ impregnation were characterized by X-ray diffraction, scanning electron microscopy (SEM) and infrared spectroscopy (IR). Analyses were done in the surface and in the center of the impregnated material.

XRD patterns, Figure 1, showed peaks assigned to quartz (JCPDS 085-0797), besides mullite, formed due to kaolinite decomposition and reaction among the raw materials. The presence of SrSnO₃ with orthorhombic structure (JCPDS 77-1798) was also observed, with higher intensity in the surface than in the center of the porous ceramic, indicating that different amounts of SrSnO₃ were present in each region of the support. IR spectrum of the porous ceramic was in agreement with XRD patterns, with well defined bands around 1074, 732 and 462 cm⁻¹, due to Si – O bond, and one band at 1180 cm⁻¹ due to AlO₄ and SiO₄ tetrahedra present in the mullite phase [3]. A small dislocation of these bands was observed due to SrSnO₃ impregnation. For these samples, one band at 690 cm⁻¹ was also observed, being assigned to Sn – O bond, characteristic of the perovskite structure. SEM micrographies, Figure 2, showed the adhesion of SrSnO₃ on the porous ceramic, confirming the previous results.

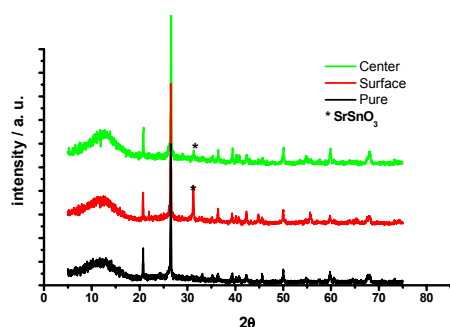


Figure 1: XRD of the porous ceramic with and without impregnation of SrSnO₃

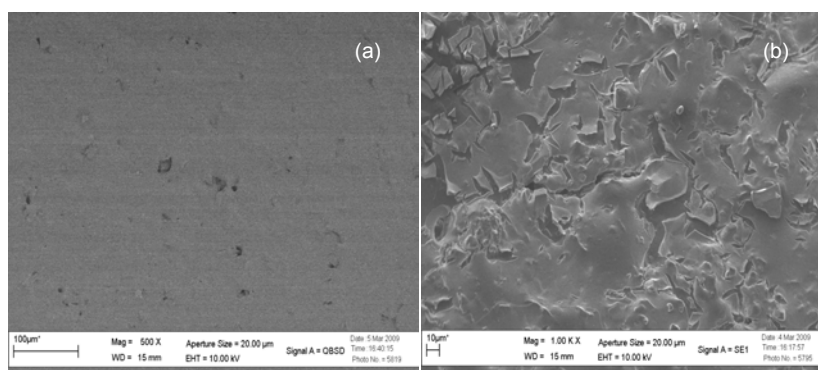


Figure 2: XRD of the porous ceramic without (a) and with (b) impregnation of SrSnO₃

References

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