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Proceedings, Abstract

On the thermal stability of mesoporous metal oxide systems decorated with metallic nanoparticles for gas sensing applications

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Mesoporous metal oxide systems decorated with metallic nanoparticles are among the most studied functional materials for their applications as chemo-resistive gas sensors. The temperature at which such materials are supposed to operate as gas sensors in real working conditions for an optimum device sensitivity ranges around 150-300ºC.

In our work, SnO_2 mesoporous systems have been prepared by solvothermal methods. As a method for tailoring the chemo-resistive properties, the obtained mesoporous matrix has been further decorated with metallic Fe nanoparticles by wet spraying methods. The as-prepared systems have been extensively investigated by analytical transmission electron microscopy using a JEOL ARM200F instrument equipped with X-ray Energy Dispersive and Electron Energy Loss spectrometers (EDS/EELS).

Our work has been focused on the morphological and structural aspects of the above mentioned system under the influence of in-situ heating up to 550ºC (a meaningful temperature from the point of view of sample preparation). The morpho-structural evolution with temperature has been emphasized by High Resolution Transmission Electron Microscopy (HRTEM), Selected Area Electron Diffraction (SAED), Scanning Transmission Electron Microscopy (STEM) and Electron Energy Loss Spectroscopy Spectrum Imaging (EELS-SI).

Keywords: *mesoporous metal oxide systems, nanoparticles, gas sensing, EDS/EELS.*

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Conflicts of Interest

The authors declare no conflict of interest.

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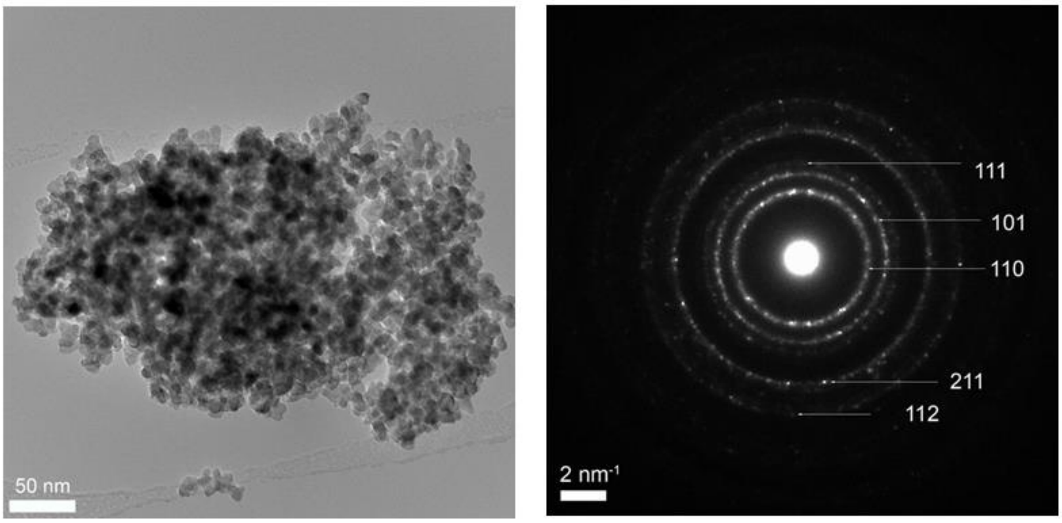

Figure 1. TEM image at low magnification recorded at room temperature and the corresponding SAED pattern revealing the tetragonal structure of the SnO2 powder decorated with Fe nanoparticles.

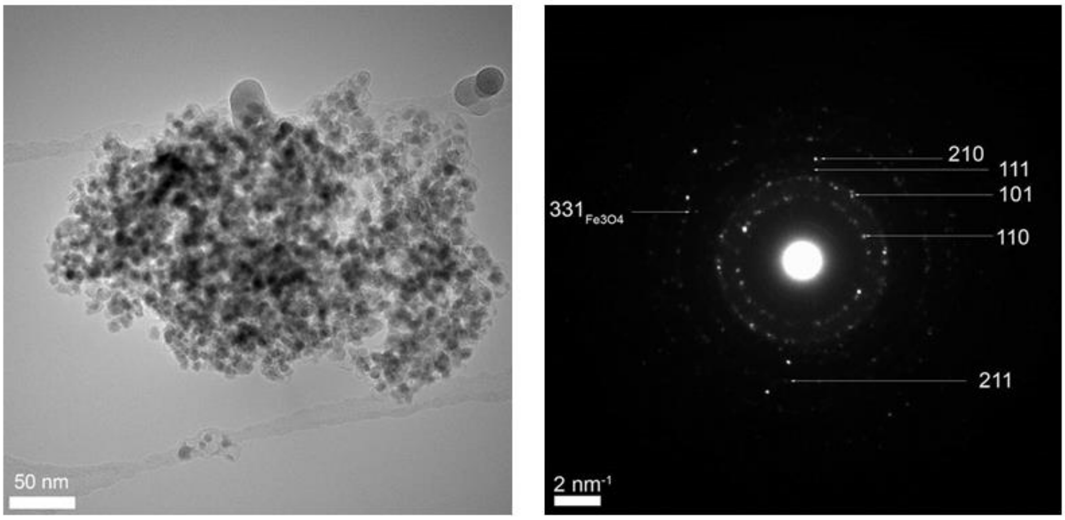

Figure 2. TEM image at low magnification recorded at 600°C and the corresponding SAED pattern revealing the tetragonal structure of the SnO2 powder decorated with Fe nanoparticles.

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