In_2O_3 as multifunctional semiconductor

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In_2O_3 based materials have attracted a remarkable interest for their unique features and multi-functional properties, which can be finely tuned by controlling the interplay between their structure, morphology and composition. A detailed insight into chemical/physical properties by using advanced experimental techniques and first principle calculations provide significant advantages from both a fundamental and an applicative point of view [1-3]. The present work presents an analysis of the influence of the insertion of different metal cations in the structural and electronic features of $In_2O_3$to elucidate how these modifications directly affected the material properties and as consequence the activity towards different applications. Lanthanide and transition metal-doped In_2O_3materials were synthetized and characterized by X-ray diffraction, UV-vis and Raman spectroscopy, photoluminescence, XPS, SEM, and TEM, and investigated by DFT simulations. The potential of the as-prepared In_2O_3were explored as catalyst into hydrogenation reactions, in electrocatalytic oxygen evolution reaction, and as O_3 gas sensor.

Acknowledgments:
CNPQ, CAPES, FAPEMIG, FAPESP, Universitat Jaume I.

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