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Nano size BaFeO_{3-d} material: The role of oxygen non stoichiometry in the CO oxidation activity

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The substitution of so-called critical elements, among which Noble Metals (NM) and some Rare Earths (RE) are included, has become a question of major concern to reach the goal of sustainable development. In the particular context of Heterogeneous Catalysis, the substitution of NM by Transition, mostly 3d, Metals, is an issue that has already received attention. In connection with this target, ABO₃ perovskite related oxides have been essayed as catalysts in a number of reactions, most of them redox processes. In particular, lanthanide based perovskites have been extensively studied as catalysts in the CO oxidation reaction. Total substitution of La by Ba fits perfectly with the actual demands to replace critical RE. BaFeO_{3-d} (0.2 < d < 0.4) depicts a 6H perovskite hexagonal structural type with Fe both in III and IV oxidation states and oxygen nonstoichiometry accommodated by random distribution of anionic vacancies. The decrease of the particle size dramatically decreases

the temperature of the reduction process of the sample. Actually, under soft conditions (T ≈ 200 °C/H₂), nano-BaFeO_{2.78} suffer an easy and reversible reduction process that occurs by a different pathway than that described for BaFeO_{3-δ} bulk material. This material proved to be more active than its lanthanide-based counterpart. The analysis of the structural and chemical aspects of the reduction process of nano-BaFeO_{2.78} makes possible to propose the role of the oxygen deficiency responsible for the CO oxidation activity of BaFeO_{3-δ}.

Speaker Biography

Marina Parras-Vazquez, full professor at Inorganic Chemistry Department in Complutense University of Madrid, currently works in the synthesis and structural/microstructural characterizations of new functional inorganic materials. She is co-author of more than 100 reviewed scientific publications and more than 100 communications to international conferences.

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