catalysts

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Rational Design of Non-precious Metal Oxide Catalysts by Means of Advanced Synthetic and Promotional Routes

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Message from the Guest Editors

Nowadays the catalytic performance of transition metal oxides, such as ceria-based mixed oxides, perovskites, hexaaluminates, hydrotalcites, and spinels can be considerably enhanced by tailoring the local surface structure (e.g., work function, reducibility, oxygen vacancies) and interfacial phenomena (e.g., metal-support interactions). The latter can be accomplished via the following strategic approaches that could be applied independently or in synergy: (i) employment of state-of-the art nano-synthesis routes towards engineering particle's size and shape (e.g., nanocubes, nanorods), ii) use of structural/surface promoters (e.g., alkali, graphene oxide) towards the optimization of structural and electronic properties, iii) employment of special pretreatment protocols towards the regulation of surface chemistry and metal-support interactions. This holistic approach in conjunction to the fundamental understanding of metal-support interactions (either geometric or electronic) is expected to lead to the development of low cost (NMs-free), highly active and stable catalysts, for real life applications in the energy and environmental sector.