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Bifunctional Metal Oxides as Heterogeneous Catalysis for CO_2 Adsorption and Conversion

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Message from the Guest Editors

Carbon capture and sequestration (CCS) that employ different types of adsorbents/sorbents involving liquid amines, basic solids, and porous materials has been widely reported and enable the concentration, purification, and storage of CO_2 from flue gas. However, the regeneration of adsorbents/sorbents relies on the high temperature thermal swing. In addition, the storage and transportation of concentrated CO_2 require high pressure, thus making the CCS process highly energy-intensive. To address the associated challenges, dual-function materials (DFMs) are currently being researched as a means to effectively capture and convert CO_2 to value-added products, such as syngas, fuels, or chemical feedstock. DFMs typically comprise both an adsorbent/sorbent and a catalytic component for CO_2 capture and conversion, respectively.

This Special Issue will cover recent developments in the synthesis, characterization, and evaluation of dual-function materials based on metal oxides and their hybrids with other materials, such as noble metal nanoparticles, basic metal oxides, carbon nitrides, etc., as effective materials for CO_2 capture, conversion, or both.

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Message from the Editor-in-Chief

Nanoscience and nanotechnology are exciting fields of research and development, with wide applications to electronic, optical, and magnetic devices, biology, medicine, energy, and defense. At the heart of these fields are the synthesis, characterization, modeling, and applications of new materials with lower nanometer-scale dimensions, which we call "nanomaterials". These materials can exhibit unusual mesoscopic properties and include nanoparticles, coatings and thin films, metal–organic frameworks, membranes, nano-alloys, quantum dots, self-assemblies, 2D materials such as graphene, and nanotubes. Our journal, *Nanomaterials*, has the goal of publishing the highest quality papers on all aspects of nanomaterial science to an interdisciplinary scientific audience. All of our articles are published with rigorous refereeing and open access.

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