

Editorial

Solid Catalysts – New Perspectives and Applications

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Heterogeneous catalysis is crucial for the progress of emerging and well-known chemical processes and it also has a very important role in environmental protection, sustainable development, recycling/upcycling, reduction of the carbon footprint, achievement of circular economy, etc. Supported catalysts are widely utilized in the production of a variety of fine and special chemicals [1-3]. Currently, there is a growing trend in the design of supported catalysts by using novel approaches to obtain suitable morphology, structure, and textural properties of both support and active matter [4]. Considering the rapid progress of a wide variety of industries, there is an increased need for transferring scientific research on improved catalysts from laboratory to industrial-scale level.

This Special Issue includes some of the topics above, as well as several examples of metal and metal-oxide-based catalysts application in various catalysis processes. Recycling/upcycling of plastic wastes back to arenes, which are used for obtaining aromatic plastics and plastic fibers can be achieved by using a Ru/Nb₂O₅ catalyst [2]. Exhaust gases from coke ovens, blast furnaces and blast oxygen furnaces in iron-making plants mainly contain CO, H₂, and CH₄. Those gases can be



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recycled by solid catalysts utilization to produce synthesis gas or methanol, by reforming reactions [5]. Some catalysts with improved properties that enable high resistance to deactivation, used for reforming gaseous hydrocarbons include Ni/perovskite systems such as Ni/LaAlO₃ and Ni/La_{0.7}Mg_{0.3}AlO_{3-δ} [4], Ni-supported on La₂O₃ + ZrO₂ where Ni is promoted with 1 wt.% of Gd, Ga, Cr and Ca [3], Ni/MgO-Al₂O₃ [6], Pd-Ni/CeO₂ [7], Ni/MgO-Ce_{0.8}-Zr_{0.2}-O₂ [8]. Catalysts based on systems WO₃/ZrO₂ or WO₃/ZrSiO₄ are used for dehalogenation of organohalogen compounds, such as Freons or fire retardants [9, 10]. V₂O₅-WO₃/TiO₂ is an example of a system for selective catalytic reduction (SCR) of NO_x [11].

Finally, as mentioned, there is a growing need to improve catalyst properties and transfer research to an industrial-scale level. Improved catalysts possess high activity, selectivity, deactivation resistance, and suitable mechanical properties. That is achieved by fine-tuning a catalytically active matter and support composition, as well as implementing various novel synthesis methods that include, for example, microwave-assisted processes, ultrasonically assisted synthesis of core-shell structured particles, ultrasonically assisted impregnation, using various sacrificial templates to obtain hierarchically ordered open porosity together with high mechanical properties, and many others [7, 12, 13]. In addition, the combination of novel and well-known technologies for catalyst production is one of the ways to produce catalysts suitable for industrial use in terms of efficiency and economy.

Author Contributions

The author did all the research work for this study.

Competing Interests

The author has declared that no competing interests exist.

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