reactions

Editorial

Editorial for the Special Issue on Traditional and Innovative Catalysts for Reactions of Industrial Interest

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Catalysis remains the indispensable bedrock of modern industrial chemistry. From commodity chemical synthesis to advanced materials production, catalytic processes are pivotal in determining reaction efficiency, product selectivity, and, increasingly, environmental sustainability. As the global imperative shifts towards a circular economy and net-zero emissions, the demand for innovative, highly efficient, and environmentally benign catalysts has never been greater.

This Special Issue of *Reactions*, titled "Traditional and Innovative Catalysts for Reactions of Industrial Interest", seeks to capture the breadth and depth of current research that addresses the technological transition required for a greener chemical landscape. The scope was intentionally broad, encompassing the full spectrum of catalytic science—from heterogeneous and homogeneous systems to enzymatic catalysis.

A crucial theme running through the submitted contributions is the need to bridge the gap between the lab bench and the industrial reactor. While academic research excels at synthesizing novel materials (such as nanostructured metal oxides, single-atom catalysts, or highly selective zeolites), the true challenge lies in scaling these designs for robust, cost-effective, and safe industrial implementation. We are proud to present a collection of papers that addresses various facets of this challenge.

We highlight selective one-pot syntheses, such as the reductive carbonylation of nitrobenzene to form the high-value pharmaceutical Paracetamol on Pd(II)-complex catalysts (Contribution 1). A major theme is Green Chemistry, featuring the use of a sustainable ecocatalyst derived from metal hyperaccumulating plants for multicomponent reactions (Contribution 2), and the efficient, mild conversion of biomass-derived levulinic acid to the biofuel additive gamma-valerolactone (Contribution 3), demonstrating high industrial potential for sustainable biomass upgrading. Other studies explore advanced catalyst engineering, such as the influence of the synthetic method on Ni-based catalysts for Methane Dry Reforming (Contribution 4), while a review focuses on bifunctional zeolite–Co catalysts for controlling Fischer–Tropsch product distribution (Contribution 5). The comparison of chemo- and biocatalysts for hexanal synthesis confirms that certain heterogeneous catalysts achieve industrially competitive turnover rates (Contribution 6). Further works expand synthetic tools, including the use of arenediazonium salts in Cu catalyzed Ullmann-type coupling (Contribution 7) and new routes to coordination chemistry precursors (Contribution 8). Finally, a mini-review on chlorophyll sensitization of TiO_2 underscores the innovative merging of natural pigments with traditional materials for enhanced photocatalytic applications (Contribution 9).

We believe that by focusing on catalysis, which truly represents one of the oldest applications of nanotechnology, we can collectively engineer a greener world. We extend

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our gratitude to all authors and reviewers for their commitment to high-quality research and their contribution to making this Special Issue a comprehensive overview of the field's exciting future.

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