catalysts

MDPI

Editorial

Editorial: Special Issue on "Advances on Catalysts Based on Copper"

Filippo Bossola * and Nicola Scotti *

Consiglio Nazionale delle Ricerche—Istituto di Scienze e Tecnologie Chimiche "Giulio Natta", Via C. Golgi 19, 20133 Milano, Italy

* Correspondence: filippo.bossola@scitec.cnr.it (F.B.); nicola.scotti@scitec.cnr.it (N.S.)

Copper-based catalysts are very active in a wide range of different reactions, such as methanol synthesis, steam reforming/WGS, hydrogenation/dehydrogenation/transfer hydrogenation, oxidation, dehydrogenative coupling, acid-base reactions, etc. These catalytic processes are, more and more, being applied to the transformation of renewable resources or platform molecules, such as lignocellulosic biomass, bioalcohols, HMF, furfural and vegetable oils. Therefore, copper catalysts are expected to play an important role in the transition towards a sustainable economy. Environmental remediation is another field in which copper-based catalysts are extremely promising. The Special Issue on "Advances on Catalysts Based on Copper" aims to cover the most recent progress and advances in the field of copper-based heterogeneous catalysts, with a special eye on biomass valorization for the production of high-added value molecules and sustainable energy production.

Bukhtiyarova et al. [1] studied Cu-Al mixed oxides in the flow hydrogenation of 5-acetoxymethylfurfural into 5-(acetoxymethyl)-2-furanmethanol, focusing on the effect of synthesis conditions, such as pH, temperature, aging time and precipitation rate, on Cu-Al layered double hydroxides. Under optimized reaction conditions, the 2 h Cu-Al catalyst, which was prepared at a constant temperature of 70 °C, a pH of 9 and an aging time of 2 h, provided a 98% yield of 5-(acetoxymethyl)-2-furanmethanol.

Liu et al. [2] investigated the degradation of methyl orange in the process of catalytic wet hydrogen peroxide oxidation by using Cu_2O particles deposited on an Al_2O_3 coating via an electrochemical method. The catalyst could reach a methyl orange degradation rate of 92% when the electrochemical deposition time was 30 min, with a catalyst dosage of 8 g and a temperature of 25 °C for 120 min. The catalytic system was also reused nine times with a final degradation rate of 75%, showing high stability.

Marelli et al. [3] adopted a simple and reproducible approach for the synthesis of a Cu-based heterogeneous catalyst on hierarchically meso-/macroporous silica monoliths, obtaining very small size-controlled CuO nanoparticles (mean diameter 2.9 nm) highly and homogeneously dispersed in the silica matrix. The catalyst was studied in the styrene oxide ring-opening reaction under continuous flow-through, reaching high conversion (97%) and selectivity ($\geq$99%).

Singh et al. [4] reported on state-of-the-art copper-based metal–organic frameworks (MOFs) as emerging catalysts for click chemistry. Click chemistry is a robust and versatile strategy to synthesize large complex compounds from relatively smaller moieties; thus, the design of novel and effective Cu(I)-based MOF catalysts is of high importance.

Kótai at al. [5] reviewed the use of copper manganese oxide spinels as catalysts in a wide range of industrially important processes. These materials show different phase relations, metal ion valence/site distribution and chemical properties that can be exploited to obtain active materials for the oxidation of carbon monoxide, nitrogen oxide and hydrogen sulfide and the oxidative removal of organic solvents such as benzene, toluene and xylene from the air.

check for updates

Citation: Bossola, F.; Scotti, N. Editorial: Special Issue on "Advances on Catalysts Based on Copper". *Catalysts* **2023**, *13*, 700. https://doi.org/10.3390/catal13040700

Received: 23 March 2023
Accepted: 30 March 2023
Published: 4 April 2023

We would like to thank all the authors for their interesting contributions, the reviewers for their precious remarks and the Editorial Office for their constant support of this Special Issue.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Bukhtiyarova, M.V.; Bulavchenko, O.A.; Bukhtiyarov, A.V.; Nuzhdin, A.L.; Bukhtiyarova, G.A. Selective Hydrogenation of 5-Acetoxymethylfurfural over Cu-Based Catalysts in a Flow Reactor: Effect of Cu-Al Layered Double Hydroxides Synthesis Conditions on Catalytic Properties. *Catalysts* **2022**, *12*, 878. [CrossRef]
2. Liu, D.-b.; Zhang, P.; Wang, J. Preparing Cu_2O/Al_2O_3 Coating via an Electrochemical Method for the Degradation of Methyl Orange in the Process of Catalytic Wet Hydrogen Peroxide Oxidation. *Catalysts* **2022**, *12*, 1308. [CrossRef]
3. Marelli, M.; Zaccheria, F.; Ravasio, N.; Pitzalis, E.; Didi, Y.; Galarneau, A.; Scotti, N.; Evangelisti, C. Copper Oxide Nanoparticles over Hierarchical Silica Monoliths for Continuous-Flow Selective Alcoholysis of Styrene Oxide. *Catalysts* **2023**, *13*, 341. [CrossRef]
4. Singh, R.; Singh, G.; George, N.; Singh, G.; Gupta, S.; Singh, H.; Kaur, G.; Singh, J. Copper-Based Metal–Organic Frameworks (MOFs) as an Emerging Catalytic Framework for Click Chemistry. *Catalysts* **2023**, *13*, 130. [CrossRef]
5. Kótai, L.; Petruševski, V.M.; Bereczki, L.; Béres, K.A. Catalytic Properties of the Spinel-Like $Cu_xMn_{3-x}O_4$ Copper Manganese Oxides—An Overview. *Catalysts* **2023**, *13*, 129. [CrossRef]