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Editorial

Green Chemistry and Environmental Processes

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This Special Issue was designed based on two complementary principles, both aimed at developing environmentally friendly production processes, in which catalysis plays a leading role. Green chemistry is the utilization of a set of principles that reduce or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products [1], while under the environmental processes heading, we want to bring together the technologies currently applied and the new proposals for the treatment of pollutants and the protection of the environment. The quest for such products and processes is transversal to all areas of study and continues to be a challenge to scientists. The aim of this Special Issue was to provide readers with examples of such processes already operating, proving that it is possible to make research "green". This Special Issue contains four articles.

One of them, by Morales-Torres et al., deals with glucose–carbon hybrids as Pt catalyst supports for continuous furfural hydroconversion in gas phase [2]. Several carbon materials were tested as dopants of glucose hydrothermal treatment, namely carbon nanotubes, reduced graphene oxides, carbon black and activated carbon, and Pt was supported on these carbon hybrids. Catalysts were used for the gas phase furfural hydroconversion in mild conditions (1 atm and below 200 °C), saving energy and avoiding the use of organic solvents. Pt catalysts supported on these "greener" supports and processes showed better catalytic performance at low temperatures than the catalyst prepared on reference material. No catalyst deactivation was found after several hours on stream, showing the "green" potential of these samples.

Park et al. reported on the pyrolysis of polyethylene terephthalate (PET) over carbon-supported Pd catalysts [3]. This process usually leads to harmful polycyclic hydrocarbons and biphenyl derivatives. For 5 wt.% Pd on activated carbon (Pd catalyst/PET ratio of 0.05), the formation and generation of noxious materials could be avoided from 400 to 700 °C. The concentration of the 2-naphthalenecarboxylic acid produced was reduced by 44%, while the concentration of biphenyl-4-carboxylic acid was reduced by 79% compared to non-catalytic pyrolysis at 800 °C. Amine compounds were also generated in smaller amounts. This Pd catalyst proved to be a promising material for a more environmentally friendly, "green" and reliable method to eliminate industrial plastic waste.

The paper by Yu et al. dealt with $Zr(SO_4)_2$/silica and $Zr(SO_4)_2$/activated carbon catalysts for the esterification of malic acid to dimethyl malate using methanol [4]. When this process is performed with traditional homogenous catalysts, no recycling is possible and undesirable side reactions occur. In the reported work, a 99% selectivity of dimethyl malate was obtained on the two catalysts, which was much higher than that of conventional H_2SO_4 (75%) and unsupported $Zr(SO_4)_2 \cdot 4H_2O$ (80%) catalysts, with a similar conversion. Moreover, the catalysts could be easily separated from the reaction media by filtration with almost no loss of activity.

Husnain et al. reported on low-temperature selective catalytic reduction (SCR) of NH_3 using maghemite (γ-Fe_2O_3) catalysts [5]. The nanoparticles prepared by a facile

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method exhibited better NH_3-SCR activity and selectivity than the catalyst prepared by a co-precipitation procedure, but also showed improved SO_2 tolerance. The best materials showed a larger surface area, better pore structure, high concentration of lattice oxygen and surface-adsorbed oxygen, good reducibility, a large number of acid sites, lower activation energy, adsorption of reactants and unstable nitrates on the surface.

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