

Recent Advances on Nano-Catalysts for Biological Processes

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We are honored to serve as the Guest Editors of this Special Issue entitled “Recent Advances on Nano-Catalysts for Biological Processes” for the journal *Catalysts*. With the increasing demand for nanoparticles and their applications in various sectors, this Special Issue focuses primarily on the catalytic application of nanoparticles in various biological processes such as wastewater treatment, dark fermentation, biofuel production, biomass pretreatment processes, production of other value-added products, and so forth. In addition to nanoparticle applications, this Special Issue also covers the green synthesis of nanoparticles using various biological sources.

This Special Issue includes eleven articles in total, out of which five are research articles [1–5] and six are reviews [6–11]. The research article by Sharaf Zeebaree et al. [1] focuses on the colorimetric detection of mercury in water samples using natural gum-based silver nanoparticles. Natural exudate (almond gum) was used as the reducing and stabilizing agents for the production of Ag nanoparticles, which were later characterized using various analytical techniques. Singhvi et al. [2] investigated the hydrolysis of soybean-extracted glycosides using an acid-functionalized magnetic cobalt ferrite alkyl sulfonic acid (CoFe₂O₄-Si-ASA) nanocatalyst for the production of aglycones, i.e., daidzein and genistein. Higher conversion efficiency was achieved in the presence of nanocatalysts in comparison to the control experiment containing enzymes. Furthermore, these nanoparticles can be easily recovered from the reaction mixture using an external magnetic field and can be reused in subsequent cycle. Tripathi et al. [3] improved the performance of microbial fuel cells (MFCs) using a modified graphite sheet anode. Modification of the anode was carried out using iron (II, III) oxide (Fe₃O₄) carbon dots, which enhance the performance of MFC. The study conducted by Saied et al. [4] focused on the synthesis of MgO nanoparticles using the *Aspergillus terreus* fungal strain and its potential as an antimicrobial agent, in the treatment of tanning effluent, and in chromium ion removal was investigated. In a similar study, Faisal et al. [5] synthesized MgO using a leaf extract of *Mentha arvensis*. The synthesized nanoparticles were shown to possess good antimicrobial and antioxidant activity. In addition to this, the anti-Alzheimer, anti-cancer, and anti-*Helicobacter pylori* activities of the synthesized nanoparticles were studied.

Apart from the original research work of the aforementioned individuals, several review articles highlighting the current trends in nanoparticle synthesis and its applications in various sectors are also included in this Special Issue. Green synthesis of various nanoparticles and its application in antibacterial and antiviral agents [6], in biomedical and environmental applications [7], dye degradation and heavy metal removal [8], biofuel production [9], and its limitations [10] are thoroughly discussed in these reviews. Furthermore, Goswami et al. [11] reviewed the application of nano-biochar as a catalyst in the process of anaerobic digestion. In addition to this, the techno-economic analysis and life-cycle assessment of nano-biochar-aided anaerobic digestion were discussed in detail. Overall, this Special Issue covers the diverse biological applications of nanoparticles along with their synthesis methods.



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