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Novel sorbents for environmental remediation

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Nowadays, one of the major environmental problems is the pollution of aquatic systems and soil by persistent pollutants. Persistent pollutants have been found widespread in sediments, surface waters, and drinking water supplies. The removal of pollutants can be accomplished prior to their discharge to receiving bodies or by immobilizing them onto soil. Sorption is the most commonly applied process, and activated carbons have been widely used. Rapid progress in nanotechnology and a new focus on biomass-based instead of non-renewable starting materials have produced a wide range of novel engineered sorbents including biosorbents, biochars, carbon-based nanoparticles, bio-nano hybrid materials, and iron-impregnated activated carbons. Sorbent materials have been used in environmental remediation processes and especially in agricultural soil, sediments and contaminated soil, water treatment, and industrial wastewater treatment. Furthermore, sorbents may enhance the synergistic action of other processes, such as volatilization and biodegradation. Novel sorbents have been employed for the removal or immobilization of persistent pollutants such as and include heavy metals (As, Cr, Cu, Pb, Cd, and Hg), halogenated organic compounds, endocrine disrupting chemicals, metalloids and non-metallic elements, and other organic pollutants.

The development and evaluation of novel sorbents requires a multidisciplinary approach encompassing environmental, nanotechnology, physical, analytical, and surface chemistry. The necessary evaluations encompass not only the efficiency of these materials to remove pollutants from surface waters and groundwater, industrial wastewater, polluted soils and sediments, etc., but also the potential side-effects of their environmental applications. The aim of this work is to present the results of the use of biochar and impregnated carbon sorbents for the removal of organic pollutants and metals. Furthermore, the new findings from the forthcoming session on Novel sorbents for environmental remediation, will also be evaluated and presented.