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Original Research Article

Role of Nanotechnology and Nanomaterials for Water Treatment and Environmental Remediation

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ABSTRACT

Nanotechnology has an impact on many scientific and technical fields, including environmental safety. Environmental applications of nanotechnology include water and wastewater treatment, in which different nanomaterials utilize adsorption and separation processes, as well as a variety of other approaches, to remove pollutants, pathogens, and other hazardous elements. Diverse forms, various composites, and active component functionalization are only a few of the ways nanomaterials are formed. To ensure a plentiful supply of water, nanostructures have presented a practical alternative. Due to its very specific area of surface, microinterface properties, and remediation potential, nanomaterials have emerged as a hot topic in environmental research. The review paper covers diverse treatment methods for wastewater, including adsorption, catalysis, spacing, and disinfection, and a range of nanomaterials such as NPs for graphene, TiO₂ nanoparticles (NPs), (nZVI), NPs for nanoscale Fe₃O₄, ZnO NPs, nanoparticles in silver (Ag-NPs), Carbon nanotubes (CNTs), and several additional NPs as well as various nanocomposite materials, such as inorganic and organic supports, magnetic nanocomposite, and nanocomposite membranes, etc. Most crucially, the possible application of nanomaterials in water and wastewater treatment is also considered in the future.

Keywords: Nanotechnology, Water Treatment, Nanocomposite, Environmental Nanomaterials, Carbon Nanotubes, Zero-Valent Iron

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