

Nanomaterial-based water purification devices offer advantages over traditional methods due to their large surface area and avoidance of carcinogenic byproducts from chlorine or chloramine. Photocatalytic titania-coated nanomembranes, applicable via atomic layer deposition, degrade organic contaminants and destroy microorganisms upon UV irradiation, showing promise for developing countries.

Nanostructured materials like magnetic nanoparticles, iron zeolite, and carbon nanotubes effectively remove toxic metal ions (Hg(II), Pb(II), etc.) causing severe health problems. Nanosized zero-valent ions act as adsorbents and catalyze photochemical oxidation of persistent contaminants. The high adsorption capacity of carbon nanotubes and dendrimers makes them valuable for advanced water purification systems.