



Applications of Quantum Dots nanoparticles in the chemical treatment of wastewater (A review)

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Abstract

Providing clean and affordable water to meet human needs is a grand challenge of the 21st century. Worldwide, water supply struggles to keep up with the fast growing demand, which is exacerbated by population growth, global climate change, and water quality deterioration. The need for technological innovation to enable integrated water management cannot be overstated. Nanotechnology-based multifunctional and highly efficient processes are providing affordable solutions to water/wastewater treatments that do not rely on large infrastructures or centralized systems. Here we review recent development in nanotechnology for water and wastewater treatment. The discussion covers candidate quantum dot (QD) nanoparticles such as ZnS, CdSe/ZnS core-shells, graphene, l-glutathione-capped-ZnSe, Cu₂O Quantum Dots and their application on methyl violet, colored organic pollutant, TNP, copper and organic contaminant removal. The results show that water/wastewater treatment using QDs is a promising field for current & future research.

Key words: Quantum Dots, nanoparticles, wastewater, pollutants, review

1. Introduction

Nanomaterials are chemical substances or materials that are manufactured and used at a very small scale. Nanomaterials are developed to exhibit novel characteristics (such as increased strength, chemical reactivity or conductivity) compared to the same material without nanoscale features. They can significantly differ in their properties comparing to either corresponding components in the pure form, or with materials/composites where both of the phases have macroscopic dimensions [1, 2]. Typical representative of such new materials are quantum dots (QDs), nanomaterials made from a semiconductor nanostructure