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Abstract

Conventional versus Modern—Novel Materials in Environmental Depollution †

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Abstract: With the development of human activities, industries and agriculture, water pollution has become a challenging problem since decades. Most of the pollutants found in water bodies are environmentally persistent and resistant to conventional wastewater treatments. Heavy metals, occupying a significant place in the category of inorganic pollutants, are non-biodegradable and tend to accumulate in living organisms, causing biological and physical complications such as liver, lungs and nervous system disfunctions. Nanoscale adsorbents are a sustainable and safe method for heavy metals' removal from polluted water, due to their high adsorption capacity and stability.

Keywords: advanced materials; water purification; green technology

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1. Introduction

As a result of technological development in recent decades, nanomaterials obtained by advanced techniques have gained new valences compared to conventional materials due to the need for maintaining "a green environment" for future generations.

The literature describes many technologies for removing contaminants from water. The conventional methods such as electrochemical ones, chemical precipitation or adsorption using carbon-based materials require high-energy consumption, and removal can be incomplete most of the time [1]. Currently, water purification technologies are based on basic structures, such as activated carbon, silica gel, zeolites or clay minerals, to more complex and expensive structures, such as three-dimensional carbon-based architectures or three-dimensional macrostructures. Nanoscale materials such as metallic or metal oxide nanoadsorbents, nanomembranes and metal organic frameworks have shown exceptional results in water remediation. Adsorption is one of the most ecofriendly and efficient methods for removing pollutants from water bodies due to the nanoadsorbents' large surface, which creates multiple adsorption sites [2].

2. Materials and Methods

This paper represents a review regarding the advantages of advanced techniques in the field of water purification compared to conventional techniques; the review includes studies published in the last years, selected using scientific databases such as Scopus, Science Direct and Elsevier.

3. Results

The present review aims to present the most recent findings in water remediation using advanced materials, showing that, at the end of purification process, a high adsorption capacity is obtained in addition to the possibility of reusing these materials due to their high stability. Moreover, advanced materials present the possibility of easy integration into an integrated depollution technology.

4. Conclusions

In conclusion, advanced materials represent a promising and, also, a cost-effectiveness option for water purification.

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