APPLICATION OF NANOTECHNOLOGY IN WATER RESEARCH

Edited By

Ajay Kumar Mishra

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Preface

The science of nanotechnology holds possibilities which will benefit the fields of science, technology and engineering. Increasing interest in the research and development of nanotechnology raises questions about its future prospects and possible consequences. Numerous studies have focused on the potential risks of nanotechnology to human health and the environment, since the properties of nanomaterials have always provided a sufficient case for ecotoxicological investigations. At present, limited knowledge and a number of major uncertainties exist regarding the behavior, chemical and biological interactions and toxicological properties of engineered nanomaterials.

An overview of what constitutes ethical and lawful conduct in the application of nanotechnology is provided in this book. Reasons are offered for the significance of nanotechnology in the context of water, along with the benefits and risks of this technology. National and international nanotechnology regulatory documents and their application to water are outlined, elaborating the complexities regarding the establishment of regulations and laws. This book therefore looks into the generation of new basic knowledge, which is crucial for the assessment of the fate and behavior of nanotechnology-based materials, and reviews current efforts concerning their possible impact.

Water pollution is a severe environmental problem. In recent years, various methods for the removal of inorganic and organic pollutants from water have been extensively studied. The removal of heavy metals from water always becomes the burning issue in research, and nanomaterials provide high surface area and a specific affinity for heavy metal adsorption from aqueous systems. They have better adsorption capacity, selectivity and stability than the nanoparticles used, and are also very effective for the removal of both organic and inorganic pollutants from water.

There has been an increasing amount of research attention directed towards the application of nanotechnology in water, including organic, inorganic and microbial pollutants. Described in this book are nanotechnology

applications for various water-related research areas of the environmental sciences such as remediation and speciation, membranes, nanomaterials and water treatment. There is also a comprehensive discussion about the advancements in water research.

Researchers working in a similar domain and those involved in water and environmental research applications will benefit from the fundamental concepts and advanced approaches described in the content of this book. Also benefiting are those who are working towards their graduate and postgraduate degrees in the area of nanotechnology. A platform is provided in this book for all researchers, as it covers an extensive amount of background information provided in recent literature, along with abbreviations and summaries. The broader research areas of chemistry, physics, materials science, polymer science, and engineering and nanotechnology are also presented in an interdisciplinary approach.

In brief, this book contains fundamental knowledge of the recent research and development advancements in the application of nanotechnology for water-related research fields.

Ajay Kumar Mishra
Editor

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