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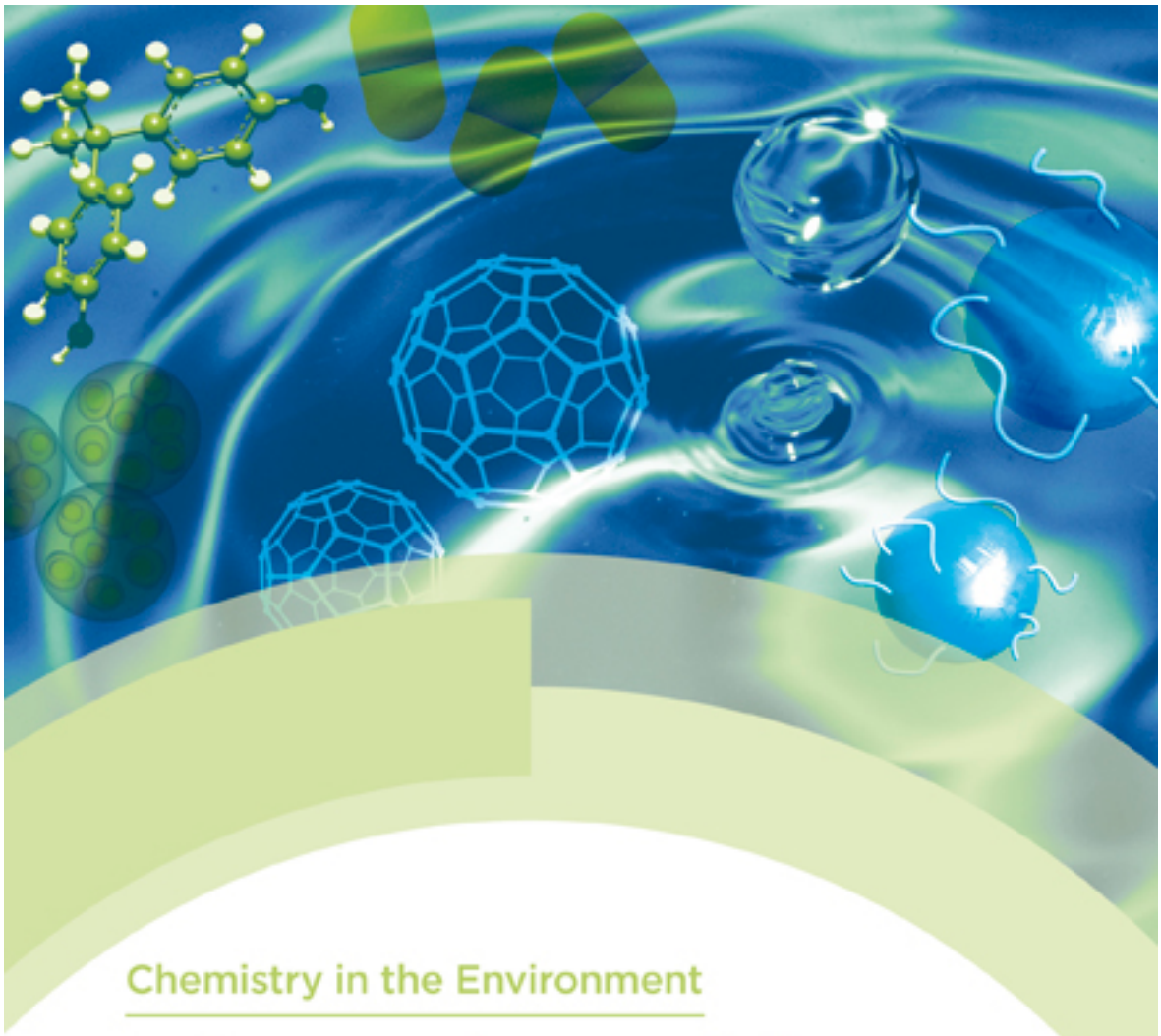

Chemistry in the Environment

Advanced Materials for Emerging Water Pollutant Removal

Edited by Pei Sean Goh, Devagi Kanakaraju, Anwar Iqbal and Ahmad Fauzi Ismail

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Advanced Materials for Emerging Water Pollutant Removal

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Water scarcity is an increasing issue on every continent. Along with climate change, the global issue is escalated by urbanization, population growth, and pollution. According to the World Bank report, 80% of wastewater enters water bodies without being adequately treated. The release of vast amounts of industrial and domestic wastewater results in the pollution of the water environment and ecosystem. Proper treatment of these wastewaters allows their reutilization for many purposes and applications including industrial processes and irrigation. Advanced materials are known to be promising tools to alleviate the impacts of these issues. In the last decade, tremendous efforts have been made to progress in the field of synthesis and application of advanced materials especially for use in environmental remediation. Advanced materials including nanomaterials and biomaterials can be used to remove pollutants from water and air. A wide range of advanced materials can be prepared through affordable, energy-efficient approaches. They can also be easily retrofitted in existing wastewater or air filtration systems.

This edited book, *Advanced Materials for Emerging Water Pollutant Removal*, explores the potential of advanced materials to deal with the various kinds of pollutants found in water bodies. This book aims to bring together the ideas and innovations of researchers working in the field, and provides a detailed overview of the development of various functional advanced materials for the removal of emerging pollutants. This edited book comprises eight chapters that focus on the synthesis, characterization, and modification of nanomaterials as well as their applications and evaluation of their performance. The engineering of materials through innovative synthesis and modification approaches allows the fine-tuning and optimization of materials in terms of their functionality and efficiency. With the ever-growing threats of conventional and emerging pollutants in our water, the advancements made over the past decade could serve as a catalyst in revolutionizing efforts in environmental remediation.

We extend our heartfelt gratitude to all the contributors for their expertise and dedication in completing the chapters. Their insights are substantial in shaping the contents of this edited book. We would also like to thank the publisher for their support throughout the preparation and production processes. Lastly, by harnessing the advantages of a broad range of advanced materials, we aim to not only address the alarming pollution and water scarcity issues, but also contribute to the Sustainable Development Goals particularly Sustainable Development Goal 6: Clean Water and Sanitation. It is hoped that this edited book will provide inspiration and guidelines to propel the research community towards a cleaner and more sustainable future.

Pei Sean Goh

Devagi Kanakaraju

Anwar Iqbal

Ahmad Fauzi Ismail

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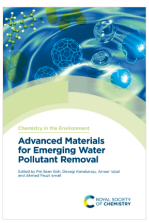

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BOOK CHAPTER

Chapter 5: TiO_2–Graphitic Carbon Nitride-based Nanocomposites for the Degradation of Emerging Pollutants

By Devagi Kanakaraju ; Lim Ying Chin

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TiO_2-based nanocomposites have been extensively explored as potential materials for the degradation of various emerging pollutants such as pharmaceuticals, dyes, and pesticides. The material's photocatalytic performances have been continually improved *via* the inclusion of semiconductor(s), cocatalysts, and doping. Graphitic carbon nitride (gC_3N_4) is regarded as a good visible light photocatalyst for the modification of TiO_2 and its nanocomposites. Binary TiO_2–gC_3N_4 and TiO_2–gC_3N_4-based nanostructures have been synthesized in related studies *via* various synthesis methods and routes such as sol–gel, hydrothermal, solvothermal and microwave methods to produce highly visible-light responsive materials with enhanced charge separation and photocatalytic activity. The type of precursors and calcination conditions also greatly influence the material's surface, optical morphology, and finally their photocatalytic activities. Both binary TiO_2–gC_3N_4 and TiO_2–gC_3N_4-based nanostructures exhibit great potential in removing emerging pollutants and can be further exploited in achieving enhanced photocatalytic performance.

Contents

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