Photocatalysts for Energy and Environmental Sustainability

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Preface

In recent years, research into energy and environmental sustainability has received more importance in interdisciplinary areas of science and engineering due to the vast increase in industrial globalization. So, many research organizations and academic institutes are promoting these frontier areas as a way of developing highly efficient, environmentally friendly technology to achieve sustainability goals. Thus, photocatalysis is an emerging, simple, and low-cost technique that has the potential to resolve issues related to hydrogen generation and the photocatalytic degradation of pollutants under sunlight illumination. This textbook summarizes the fundamental mechanisms, properties, and applications of different types of photocatalysts. It contains seven chapters that cover the current progress and future scope of new and advanced photocatalytic materials, written by well-known authors in these fields. Therefore, this textbook is designed to be of benefit in undergraduate as well as postgraduate courses in science and technology. As per the global scope of environmental research, this book can provide an ideal platform for the reader to understand the concepts presented in a more systematic way, increasing their interest in the content of the book. So, we thank all the contributing authors for their efforts to enhance the depth of this book and their expertise in making this textbook attractive among the other books. We also thank IOP Publishing for introducing this textbook on new and advanced photocatalytic materials and their sustainable approach for the betterment of mankind. We sincerely hope this book can ultimately make a significant contribution to research and development activities in the field of photocatalysis.

Editor biographies

Vijay B Pawade

Dr Vijay B Pawade is an assistant professor (Sr.Gr) in the Department of Applied Physics at the Laxminarayan Innovation Technological University, Nagpur, India. His research focuses on rare-earth-doped oxide materials and their applications in light-emitting diodes (LEDs), solar cell devices and photocatalytic processes. He has published 45 research papers in respected international peer-reviewed journals and acts as a reviewer for journals published by Elsevier, Springer, Wiley, Taylor and Francis, the Royal Society of Chemistry, and the American Chemical Society. He has contributed 12 book chapters on different themes such as nanomaterial synthesis and characterization, the applications of nanomaterials in energy conversion and storage devices, quantum dots (QDs), the spectroscopy of lanthanides, etc. He is the author of books titled Phosphor for Energy Saving and Conversion Technology (***CRC Press—Taylor and Francis***), Optical Properties of Phosphate and Pyrophosphate Compounds, and Lanthanide-Doped Aluminate Phosphors (***Woodhead Publishing—Elsevier***). He has edited five books on Nanomaterials for Green Energy (***Elsevier***), Spectroscopy of Lanthanide-Doped Oxide Materials ***(Woodhead Publishing—Elsevier***), Multifunctional Nanostructured Metal Oxides for Energy Harvesting and Storage Devices (***CRC Press—Taylor and Francis***), Handbook of Nanomaterials for Wastewater Treatment (***Elsevier***), Nanoscale Compound Semiconductors and their Optoelectronics Applications (***Woodhead Publishing—Elsevier***), Phosphor Handbook: Process, Properties and Applications (***Woodhead Publishing—Elsevier***).

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its 2020 issues. He is a fellow of the Maharashtra Academy of Sciences (MASc) and a fellow of IIChE. He was the recipient of the Best Scientist Award from Rashtrasant Tukadoji Maharaj Nagpur University in 2017. He also received a Young Scientists (Award) start-up research grant from the Science and Engineering Research Board, New Delhi (India) in 2015. He has guided 28 M.Tech. students and one PhD student; two M.Tech. and three PhD students are currently working with him.

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