
Handbook of Ecomaterials

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Editors

Handbook of Ecomaterials

With 1227 Figures and 343 Tables

 Springer

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Preface

Ecomaterials (“*materials enhancing the environmental improvement throughout the whole life cycle, while maintaining accountable performance*” [Halada K, Yamamoto R (2001) The current status of research and development on eco-materials around the world. MRS Bull 26(11):871–878]), frequently called as “environmentally-friendly materials,” are the object of an increased attention of researchers worldwide, allowing enhancement of material recyclability and energy efficiency. Being compared with classic materials, ecomaterials should have at least one of such superior properties (Yagi K (2002) Concept and development of ecomaterials. In: Proceedings of international workshop on eco-materials, National Institute for Materials Science, Tokyo), such as reusability and recyclability, biological safety ability, cleanability, energy-saving ability, and sustainability, among others.

Up to date, a host of modern ecomaterials has been fabricated to be used in industry of construction, textile, chemicals, petroleum, polymers, electronic devices, etc. These ecomaterials can be classified as renewable, recycled, hazardous-free, serving for waste treatment, easy disposal, efficiency, and energy efficiency, for green energy, and for reducing human health impacts. In this handbook, we have collected contributions of the leading specialists on ecomaterials worldwide in the fields of their fabrication, characterization, and applications in the areas of treatment of distinct types of wastes, volatile organic compounds and CO₂, energy/hydrogen production, storage and recovery, catalysis and photocatalysis, sensor applications, textile, construction, lubricant and packaging materials, as well as medical and biomedical ecomaterials, materials for aggressive media and radiation protection, and medical and biomedical ecomaterials, among other materials with special properties. Ecomaterials on the basis of adsorbents, microporous and mesoporous materials, metals and other inorganic ecomaterials, polymers, cellulose, biomass, and other natural sources are presented.

This handbook presents a complete overview of the fabrication, characterization, functional properties, and applications of ecomaterials, summarizing the main contributions in the field of materials for a green and sustainable development in the chapters elaborated by recognized international authors with wide experience in the area. The editors hope that the present handbook offers a global perspective of the possibilities of ecomaterials and their integration in a sustainable-based economy for the future.

We also expect this work provides the basis for establishing the strategies to improve the performance of ecomaterials, reducing the gap for their industrial production and implementation in technological processes. Additionally, we hope this handbook fulfills its function as an integral educational resource for young students, researchers, engineers, and technologists.

We are extremely grateful to all authors for their hard work in creation of the present handbook and hope that this collection will be a useful guide for developing novel materials for sustainable future.

Leticia Myriam Torres Martínez
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About the Editors



Professor Dr. Leticia Myriam Torres Martínez is recognized as certified leader in renewable energy and energy efficiency applied by Harvard University, USA. She has the following academic products: more than 181 indexed articles, 67 directed thesis, 1 authorized patent and 4 registered, 7 book chapters, 2 books, 383 international lectures, 9 proceeding books, 27 innovations and technological developments, 57 research projects, 2,056 citations to publications, leader of 5 research groups and 3 national scientific networks, and 5 designed and implemented postgraduate programs. Two of these programs were designed and offered as UNI Enterprise (Vitro and Cemex). She designed and implemented the Center for Research and Development of Ceramic Materials (CIDEMAC), which was self-financed during her leadership. From the year 2009, she led a technological development project with PEMEX, which allowed the pre-boot technology change in their processes. This project concluded successfully in December 2012.

Her research lines of interest are (a) the development of advanced materials (powders and thin films) for renewable energy systems and sustainable environmental decontamination; (b) synthesis, characterization, and performance of multifunctional materials on photoinduced processes; (c) preparation of semiconductor materials for environmental photo(electro)catalysis, H₂ production, CO₂ photoconversion, and water purification; and (d) synthesis of new ceramic oxides based on phase equilibrium diagrams.

She has more than 62 national and international awards and recognitions, which we highlight: (1) 21 awards for UANL Best Research Work in exact sciences and engineering and technology areas, the most recent in

2018, awarded in exact sciences; (2) “Flame, Life and Woman” recognition by remarkable career and outstanding work in the field of education and research, as part of International Women’s Day. UANL, in 2012; (3) appointment as member of the board and representative of researchers in the areas VI and VII of SNI in the Technological and Scientific Advisory Forum 2008 to 2011; (4) nomination of CIDEMAC in the National Award of Technology by SECOFI, which was one of the three finalist companies of technology research (out of 180), awarded in Los Pinos and headed by President Ernesto Zedillo Ponce de Leon in 2000; (5) In 2018 she won the National Award of Science in Mexico and received it from the hands of the Mexican President Enrique Peña Nieto.



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