# GREEN SYNTHESIS OF NANOMATERIALS FOR BIOENERGY APPLICATIONS

EDITED BY
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# Green Synthesis of Nanomaterials for Bioenergy Applications

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# Foreword

Bioenergy is a potential option to replace fossil fuels effectively and in a sustainable manner. Various known bioenergy options such as biohydrogen, biogas, biomethane, bioethanol, biomethanol, biobutenol, algal biofuels, and biodiesel are supposed to be very promising alternative renewable energy options for eliminating severe environmental issues. Significant efforts have been made to explore various bioenergy options and related technologies in practice. However, its commercial viability and symmetrical distribution are still a long way from practical implementation of bioenergy technologies. This book series explores the use of nanotechnology, which is grabbing the attention of the biofuels sector by playing the role of enhancer, to improve bioenergy production technology. Application of nanotechnology is emerging as new area for bioenergy production through its contribution as catalyst, enzyme, and microbial immobilizer. Nanomaterials have enormous potential for commercial markets and the industrial market is expected to grow and become more flexible in coming decades. Therefore, with an accelerating demand for viable and sustainable economic bioenergy production, the potential combination of bioenergy and nanotechnology area must be explored.

*Green Synthesis of Nanomaterials for Bioenergy Applications* is much needed contribution to this series and I am happy to write this positive and satisfactory message. The book contains nine chapters covering green synthesis and characterization of nanomaterials for cost-effective bioenergy applications. The current world scenario of bioenergy and application of nanotechnology in bioenergy production, different immobilization methods for enhancing

bioenergy production, synthesis, and mechanism of nanomaterial for economic bioenergy production with green approach are presented and discussed in detail. The book presents a new horizon of advancement and sustainable solutions for the improvement of bioenergy production in the form of nanotechnology. These chapters suggest that the application of nanotechnology will play a major role in bioenergy production and they will serve as gems for those working in the relevant fields including scientists, researchers, teachers, and students.

I am taking the opportunity to congratulate Dr. Neha Srivastava [IIT (BHU) Varanasi], Dr. Manish Srivastava [IIT (BHU) Varanasi]), Prof. (Dr.) P.K. Mishra [IIT (BHU) Varanasi], and Dr. Viaji Kumar Gupta for their significant efforts in bringing about this publication in order to fulfill the needs of scientists, teachers, researchers, and students. My congratulations to all the editors for their contribution, devotion, and dedication in this endeavor. All the authors and editors of this book deserve sincere appreciation for their commendable achievements.

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