



# GREEN SYNTHESIS OF NANOMATERIALS FOR BIOENERGY APPLICATIONS

EDITED BY

NEHA SRIVASTAVA | MANISH SRIVASTAVA  
P. K. MISHRA | VIJAI KUMAR GUPTA

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# **Green Synthesis of Nanomaterials for Bioenergy Applications**

*Edited by*

**Neha Srivastava**

*Department of Chemical Engineering and Technology, IIT (BHU), Varanasi, Uttar Pradesh, India*

**Manish Srivastava**

*Department of Chemical Engineering and Technology, IIT (BHU), Varanasi, Uttar Pradesh, India*

**P. K. Mishra**

*Department of Chemical Engineering and Technology, IIT (BHU), Varanasi, Uttar Pradesh, India*

**Vijai Kumar Gupta**

*ERA Chair of Green Chemistry, Department of Chemistry and Biotechnology, School of Science, TALLINN University of Technology, Tallinn, Estonia*

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# List of Contributors

## ***Nihan Arabaci***

Department of Biology  
Faculty of Arts and Sciences Çukurova University  
Adana  
Turkey

## ***Pietro Bartocci***

Department of Engineering  
University of Perugia  
Perugia  
Italy

## ***Gianni Bidini***

Department of Engineering  
University of Perugia  
Perugia  
Italy

## ***Ayse Demirbas***

Faculty of Fisheries and Aquatic Sciences  
Recep Tayyip Erdogan University  
Rize  
Turkey

## ***Maduraimuthu Djanaguiraman***

Department of Crop Physiology  
Tamil Nadu Agricultural University  
Coimbatore  
Tamil Nadu  
India

## ***Kashyap Kumar Dubey***

Bioprocess Engineering Laboratory  
Department of Biotechnology  
Central University of Haryana

Mahendergarh  
Haryana  
India

**Francesco Fantozzi**  
Department of Engineering  
University of Perugia  
Perugia  
Italy

**Fausto Gallucci**  
Inorganic Membranes and Membrane Reactors  
Department of Chemical Engineering and Chemistry  
Eindhoven University of Technology  
Eindhoven  
the Netherlands

**Song Hu**  
State Key Laboratory of Coal Combustion  
Huazhong University of Science and Technology  
Wuhan  
Hubei  
China  
China-EU Institute for Clean and Renewable Energy  
Huazhong University of Science and Technology  
Wuhan  
Hubei  
China

**Indu**  
Bioprocess Engineering Laboratory  
Department of Biotechnology  
Central University of Haryana  
Mahendergarh  
Haryana  
India

***Kalpesh B. Ishnava***

Assistant professor

Ashok and Rita Patel Institute of Integrated Studies and Research in Biotechnology and Allied Sciences (ARIBAS)

Anand

Gujarat

India

***Tuna Karaytuğ***

Department of Biology

Institute of Natural and Applied Sciences

Çukurova University

Adana

Turkey

***Subburamu Karthikeyan***

Department of Renewable Energy Engineering

Agricultural Engineering College and Research Institute

Tamil Nadu Agricultural University

Coimbatore

Tamil Nadu

India

***Ahmet Kati***

Department of Detergent and Chemical Technologies

Hayat Kimya Research and Development Center

Kocaeli

Turkey

***Thangavelu Kiruthika***

Department of Renewable Energy Engineering

Agricultural Engineering College and Research Institute

Tamil Nadu Agricultural University

Coimbatore

Tamil Nadu

India

***Mrinal Kanti Mandal***

Department of Chemical Engineering  
NIT Durgapur  
Durgapur  
West Bengal  
India

***Vishal Mishra***

School of Biochemical Engineering IIT (BHU)  
Varanasi  
Uttar Pradesh  
India

***Ali Nematollahzadeh***

Chemical Engineering Department  
University of Mohaghegh Ardabili  
Ardabil  
Iran

***Pavlos Nikolaidis***

Department of Electrical Engineering  
Cyprus University of Technology  
Limassol  
Cyprus

***Ismail Ocsoy***

Department of Analytical Chemistry  
Faculty of Pharmacy  
Erciyes University  
Kayseri  
Turkey

***Balasubramaniam Prabha***

Department of Renewable Energy Engineering  
Agricultural Engineering College and Research Institute  
Tamil Nadu Agricultural University  
Coimbatore

Tamil Nadu  
India

***Desikan Ramesh***

Horticultural College and Research Institute for Women  
Tamil Nadu Agricultural University  
Tiruchirappalli  
Tamil Nadu  
India

***Giovanni Russo***

Department of Engineering  
University of Perugia  
Perugia  
Italy

***Karishma I. Sheikh***

Ashok and Rita Patel Institute of Integrated Studies and  
Research in Biotechnology and Allied Sciences (ARIBAS)  
Anand  
Gujarat  
India

***Veer Singh***

School of Biochemical Engineering  
IIT (BHU)  
Varanasi  
Uttar Pradesh  
India

***Øyvind Skreiberg***

SINTEF Energy Research  
Trondheim  
Norway

***Zahra Vaseghi***

Chemical Engineering Department  
University of Mohaghegh Ardabili

Ardabil  
Iran

**Liang Wang**  
SINTEF Energy Research  
Trondheim  
Norway

**Priyanka Yadav**  
School of Biochemical Engineering  
IIT (BHU)  
Varanasi  
Uttar Pradesh  
India

**Ankush Yadav**  
Bioprocess Engineering Laboratory  
Department of Biotechnology  
Central University of Haryana  
Mahendergarh  
Haryana  
India

**Haiping Yang**  
State Key Laboratory of Coal Combustion  
Huazhong University of Science and Technology  
Wuhan  
Hubei  
China  
China-EU Institute for Clean and Renewable Energy  
Huazhong University of Science and Technology  
Wuhan  
Hubei  
China

**Ebru Sebnem Yilmaz**  
Department of Biology  
Faculty of Arts and Science

Hatay Mustafa Kemal University  
Antakya  
Hatay  
Turkey

# 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, biobutanol, 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.

***Dr. Anthonia O'Donovan***

*Applied Biology and Biopharmaceutical Science,  
School of Science and Computing,  
Galway-Mayo Institute of Technology,  
Galway, Ireland*

***Date: 10.06.2019***

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# About the Editors

## **Dr. Neha Srivastava**

Institute Post-Doctoral Fellow, Department of Chemical Engineering and Technology

IIT (BHU) Varanasi, Varanasi-221 005, U.P., India

Mobile no. +91-9 988 062 681, Email:

[sri.neha10may@gmail.com](mailto:sri.neha10may@gmail.com)

**Field of Expertise:** Biofuels production, microbial bioprocessing, and enzyme technologies



Neha Srivastava is currently working as a post-doctorate fellow in the Department of Chemical Engineering and Technology, IIT (BHU) Varanasi, India. She has published 26 research articles in peer-reviewed journals and has filed three patents. She completed her PhD from Department of Molecular and Cellular Engineering, SHIATS, India in 2016 in the area of bioenergy. Neha has been received six Young

Scientist Awards. Presently, she is working on biofuels production (cellulase enzymes; production and enhancement; biohydrogen production from waste biomass; bioethanol production).

**Dr. Manish Srivastava**

SERB-Research Scientist

Department of Chemical Engineering and Technology  
IIT (BHU) Varanasi, Varanasi-221 005, U.P., India

E-mail: [84.srivastava@gmail.com](mailto:84.srivastava@gmail.com),  
[manish\\_mani84@rediffmail.com](mailto:manish_mani84@rediffmail.com)

Contact no: + 91-7 503 757 601

**Field of Expertise:** Synthesis of nanomaterials and their application as catalysts for development of electrode materials in energy storage, biosensors, and biofuels production.



Manish Srivastava has worked as DST INSPIRE faculty in the Department of Physics and Astrophysics, University of Delhi, India during June 2014 to June 2019. Currently he is working as SERB-Research Scientist in the Department of Chemical Engineering and Technology IIT (BHU), Varanasi, India. He has published 46 research articles in peer-reviewed journals, authored several book chapters, and filed one patent. He worked as a post doctorate fellow in the Department of BIN Fusion Technology, Chonbuk National University from August 2012 to August 2013. He was an Assistant Professor in the Department of Physics, DIT School of Engineering, Greater Noida, from July 2011 to July 2012. He received his PhD in Physics from the Motilal Nehru National Institute of Technology, Allahabad,