

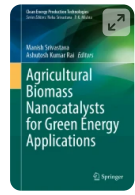
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Manish Srivastava  
Ashutosh Kumar Rai *Editors*

# Agricultural Biomass Nanocatalysts for Green Energy Applications

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# Agricultural Biomass Nanocatalysts for Green Energy Applications

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## Overview

Editors: [Manish Srivastava](#), [Ashutosh Kumar Rai](#)

- Covers the use of sustainable application of nanomaterial for green energy
- Educates readers on use of nanomaterials in clean biofuel production in economical way
- Elucidates the conversion of agricultural waste into nanocatalysts for bioenergy production

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## About this book

The book discusses the various sustainable approaches to combine agrowaste and nanomaterials into catalysts or nanocatalysts with the objective of enhancing biofuel production. It explores the practical sustainability of agronanocatalysts in bioenergy production at a mass scale, while also addressing the existing challenges and proposes sustainable remedies to overcome these limitations. Additionally, the book dives into the cost considerations, recognizing it as a major concern for the widespread utility of catalysts, and explores viable commercial applications in this context.

Nanomaterials continue to attract attention in the field of proteins and enzymes due to their versatile physicochemical properties and potential. They offer opportunities to enhance various biofuel production processes by serving as catalysts in the reaction medium. For instance, studies have highlighted the significant improvements in cellulase enzyme production, stability, pretreatment of lignocellulosic biomass, and enzymatic hydrolysis efficiency achieved through the utilization of nanomaterials. The impact of nanomaterials on fermentative hydrogen production has also been documented. While the application of nanomaterials in biofuel production processes has been reported in the literature, there remains a need to focus on the type of nanomaterials, their synthesis, and their specific effects on important process parameters. Addressing and evaluating these factors is crucial to effectively improve and streamline biofuel production processes using nanomaterials.

The book serves as a comprehensive introduction to nanomaterials and nanotechnology in biofuel production, catering to the needs of researchers, academicians and students.

## Keywords

[Agriculture waste](#)

[Nanomaterials](#)

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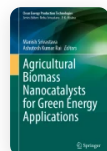
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# Advances in Nanocatalysts Mediated Biodiesel Production

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## Agricultural Biomass

## Nanocatalysts for Green Energy

## Applications

[Vaishnavi Mishra](#), [Parnika Mishra](#), [Diksha Sharma](#), [Priyanka Yadav](#), [Priyanka Dubey](#), [Gyanendra Tripathi](#), [Vishal Mishra](#) & [Alvina Farooqui](#)

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## Abstract

The area of biodiesel production has witnessed significant advancements in recent years, propelled by the exploration of nanocatalysts as efficient agents in the process of transesterification. Nanocatalysts, with their high surface area and enhanced catalytic activity, have emerged as key contributors to the optimization of biodiesel production processes. Various reviews have revealed nanocatalysts, including metal nanoparticles, metal oxides, and hybrid materials, assessing their catalytic efficiency and stability in transesterification reactions. Researchers have successfully tailored nanocatalysts to exhibit superior performance in converting triglycerides to biodiesel, addressing challenges associated with traditional catalysts such as low reusability and selectivity. In this chapter, we will discuss the implications of the above-mentioned advancements on the scalability and economic viability of biodiesel production. The integration of nanocatalysts not only accelerates reaction kinetics but also facilitates the use of diverse feedstocks, expanding the potential sources for the production of biodiesel. The environmental sustainability of these nanocatalysts, including their recyclability and reduced waste generation, is also discussed. The findings presented in this research hold promise for a more sustainable and efficient future in the realm of biofuel production. In short, the present chapter gives a transformative impact of nanotechnology on the synthesis of biodiesel.

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### Cite this chapter

Mishra, V. *et al.* (2024). Advances in Nanocatalysts Mediated Biodiesel Production. In: Srivastava, M., Rai, A.K. (eds) Agricultural Biomass Nanocatalysts for Green Energy Applications. Clean Energy Production Technologies. Springer, Singapore. [https://doi.org/10.1007/978-981-97-1623-4\\_9](https://doi.org/10.1007/978-981-97-1623-4_9)

[.RIS](#)  [.ENW](#)  [.BIB](#) 

DOI  
[https://doi.org/10.1007/978-981-97-1623-4\\_9](https://doi.org/10.1007/978-981-97-1623-4_9)

Published  
30 April 2024

Publisher Name  
Springer, Singapore

Print ISBN  
978-981-97-1622-7

Online ISBN  
978-981-97-1623-4

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