

# Biodiesel Production with Green Technologies



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*This book is dedicated to my beloved  
parents, Md. Korban Ali and Mst Mahamuda  
Begum, with love.*

*Actually, my parents don't read book,  
so if someone doesn't tell them about this,  
they'll never know.*

*Aminul Islam*

*Dedicated to two noble souls of my life  
my divine parents  
"Babha Anjaiah Pogaku  
and Amma Shantha bai"*

*Pogaku Ravindra*



# Abstract

Renewable energy resources appear to be one of the most efficient and effective solutions. Thus, it is essential to replace gradually the current nonrenewable resources with renewable ones to meet future demand of energy. Many of the changes are having a profound influence on renewable energy, from policies explicitly designed to promote renewable energy. Among the many renewable fuels currently available around the world, biodiesel offers an immediate impact in our energy. Biodiesel is a renewable, biodegradable, and nontoxic fuel. Biodiesel production using various types of heterogeneous metal oxide catalysts has been studied in the past. However, most of these catalysts have been prepared in the form of powders with sizes ranging from nano- to micrometer. The small particle size may offer high catalytic activity, but it gives rise to several problems such as high pressure drops, poor mass/heat transfer, poor contact efficiency, and difficulties in handling and separation. From the practical point of view, handling of small particles could be difficult due to the formation of pulverulent materials. Therefore, attention has been paid to the selection of green catalytic process in this book where the catalyst could be highly selective towards the formation of a desired product. Furthermore, the catalyst could be easily handled, recovered from the reaction medium and subsequently reused. The main focus is on the description of the state of the art on catalytic processes that are expected to play a decisive role toward the “green” production of biodiesel. Our effort in this area are directed toward understanding the mechanisms involved in the synthesis and structure formation of catalyst in order to get high yield of biodiesel production. At the same time, this book addresses the question of how catalytic material should be distributed inside a porous support to obtain optimal performance. This understanding can be used to control the microstructure of the catalyst, and hence the properties of catalyst. The effects of physicochemical and operating parameters are analyzed

to gain insight into the underlying phenomena governing the performance of optimally designed catalysts. A balance description of theory and experiment and stress problems of commercial importance have also been emphasized in this book.



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