

# Preface

Today's world is facing two critical problems: (1) high fuel prices, and (2) climatic changes. Experts suggest that current oil and gas reserves would suffice to last only a few more decades. It is well known that transport is almost totally dependent on fossil fuels, particularly petroleum-based fuels such as gasoline, diesel fuel, liquefied petroleum gas, and natural gas. Of special concern are the liquid fuels used in automobiles. Hence, there has been widespread recent interest in learning more about obtaining liquid fuels from non-fossil sources. The combination of rising oil prices, issues of security, climate instability, and pollution, and deepening poverty in rural and agricultural areas, is propelling governments to enact powerful incentives for the use of these fuels, which is in turn sparking investment. In fact, the world is on the verge of an unprecedented increase in the production and use of biofuels for transport. Production of grain-based ethanol and vegetable-oil-based biodiesel is today facing difficulties due to competition with food supply. This book unifies the production of various usable liquid fuels from biomass by using a variety of technologies.

Biofuels appear to be a potential alternative “greener” energy substitute for fossil fuels. They are renewable and available throughout the world. Biomass can contribute to sustainable development and globally environmental preservation since it is renewable and carbon neutral.

This book on biofuels attempts to address the needs of energy researchers, chemical engineers, chemical engineering students, energy resources specialists, engineers, agriculturists, crop cultivators, and others interested in a practical tool for pursuing their interests in relation to bioenergy. Each chapter in the book starts with basic/fundamental explanations suitable for general readers and ends with in-depth scientific details suitable for expert readers. General readers will include people interested in learning about solutions for current fuel and environmental crises. Expert readers will include chemists, chemical engineers, fuel engineers, agricultural engineers, farming specialists, biologists, fuel processors, policy makers, environmentalists, environmental engineers, automobile engineers, college

students, research faculties, *etc.* The book may even be adopted as a text book for college courses that deal with renewable energy and/or sustainability.

The Introduction already comprises one seventh of the book; in these pages emphasis is laid in detail on global energy sources, fossil fuels, and renewables, *i.e.*, biomass, hydro, wind, solar, geothermal, and marine energy sources. The second chapter is entitled “Biomass Feedstocks” and includes main biomass sources, characterization, and valorization. The third chapter is an introduction to biofuels. Furthermore, processing conditions are discussed briefly, as well as alternative applications of biorenewable feedstocks in the following chapters. The fourth and fifth chapters on “Liquid and Gaseous Biofuels”, including main liquid biofuels such as bioethanol, biodiesel, biogas, biohydrogen, liquid and gaseous fuels from the Fischer–Tropsch synthesis are addressed in detail. The sixth chapter on “Thermochemical Conversion Processes” covers the utilization of biorenewables for engine fuels and chemicals. The seventh and eighth chapters include “Biofuel Economy and Biofuel Policy”.

Trabzon, Turkey, July 2008

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Biofuels

Securing the Planet's Future Energy Needs

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2009, X, 336 p., Hardcover

ISBN: 978-1-84882-010-4