

# Preface

The book presents various hydrogen production systems in general, and solar hydrogen production systems in particular, and their energy and exergy analyses. This book is also concerned with various chemical processes involved in hydrogen production. The primary energy sources, conventional and nonconventional, that are used to produce hydrogen are also studied in brief for analysis and comparison. The sustainability aspects of different methods are evaluated in terms of a sustainability index, and the environmental impact assessments of different methods are also evaluated in terms of the environmental impact reduction factor.

The most feasible and commercially practiced method of hydrogen production is water electrolysis. Many other methods, for example, thermolysis, thermochemical cycles, gasification, cracking, and reforming, are used to produce hydrogen. In addition to high-temperature solar hydrogen production, other methods such as photovoltaic-based hydrogen production, photo-electrolysis, and bio-photolysis are also covered here. Some other methods that are discussed in the book are hydrogen production through carbonization of bituminous coal, solar hydrogen production via biomass and hydrogen production by decarbonization of fossil fuels.

This book aims to provide a useful source for researchers, scientists, engineers, and practitioners working in the field of solar hydrogen production because it provides some quality analysis of solar thermal hydrogen production systems and solar photovoltaic-based hydrogen production systems.

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