

Contents

Volume I: Hydrogen Production and Energy Transition

Series editor preface — VII

Volume editor: Marcel Van de Voorde — IX

List of contributors (for Volume I) — XXI

Paolo Ciambelli, Marcel Van de Voorde

Hydrogen: Present Accomplishments and Far-Reaching Promises — 1

Forewords

Louis Schlapbach

Foreword — 9

Alexander Wokaun

Foreword — 15

Extended Introductions

Pierre Etienne Franc

Hydrogen: why the times to scale have come — 29

Ad van Wijk

Hydrogen key to a carbon-free energy system — 43

Paula Abreu Marques, Ruud Kempener

The European hydrogen strategy — 105

Andreas Züttel

Introduction to the hydrogen books — 117

Václav Bartuška

Geopolitics of hydrogen — 127

Volume I: Hydrogen production and energy transition

Gaetano Iaquaniello, Emma Palo, Annarita Salladini

- 1 An overview of today's industrial processes to make hydrogen and future developments' trend — 137**

Paolo Ciambelli

- 2 Catalytic autothermal reforming for hydrogen production: from large-scale plant to distributed energy system — 171**

Oscar Daoura, Maya Boutros, Franck Launay

- 3 An overview of recent works on Ni silica-based catalysts for the dry reforming of methane — 193**

Maria Mikhail, Jacques Amouroux, Maria Elena Galvez, Stéphanie Ognier, Patrick Da Costa

- 4 CO₂ hydrogenation by plasma-assisted catalysis for fuel production: power-to-gas application — 213**

Alberto Giaconia, Massimiliano Della Pietra, Giulia Monteleone, Giuseppe Nigliaccio

- 5 Development perspective for green hydrogen production — 251**

Long Han, Qinhui Wang

- 6 Hydrogen production from biomass pyrolysis — 279**

Qinhui Wang, Long Han

- 7 Gasification of biomass and plastic waste — 303**

Martin Paidar, Karel Bouzek

- 8 Water electrolysis as an environmentally friendly source of hydrogen — 331**

Nicolas Grimaldos-Osorio, Kristina Beliaeva, Jesús González-Cobos, Angel Caravaca, Philippe Vernoux

- 9 Electrolysis for coupling the production of pure hydrogen and the valorization of organic wastes — 359**

Stefano Campanari, Paolo Colbertaldo, Giulio Guandalini

**10 Renewable power-to-hydrogen systems and sector coupling
power-mobility — 381**

Paolo Ciambelli, Maria Sarno, Davide Scarpa

11 Photoelectrocatalytic H₂ production: current and future challenges — 401

Dimitrios A. Pantazis

12 Biological water splitting — 427

Gunther Kolb

13 Fuel processing for fuel cells and energy-related applications — 469

Cheng Yi Heng, Susu Nousala

**14 Emergent-based well-being design for a hydrogen-based community:
social acceptance and societal evolution for novel hydrogen
technology — 493**

Giuseppe Ricci, Maurizio Dessì, Marco Tripodi, Paolo Fiaschi, Roberto
Palmieri, Luca Eugenio Basini, Thomas Pasini, Alessandra Guarinoni

15 Eni's projects in Italy for hydrogen production — 519

Marcel Van de Voorde, Paolo Ciambelli

Conclusions and Recommendations: "The Future of Hydrogen" — 543

Index — 551