1. Record Nr. UNINA9910820544803321

Titolo	Green carbon dioxide : advances in CO2 utilization / / edited by Gabriele Centi, Siglinda Perathoner
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley, , 2014 ©2014
ISBN	1-118-83194-2 1-118-83192-6 1-118-83193-4
Descrizione fisica	1 online resource (327 p.)
Altri autori (Persone)	CentiG <1955-> (Gabriele) PerathonerSiglinda <1958->
Disciplina	665.8/9
Soggetti	Carbon dioxide - Industrial applications Carbon dioxide mitigation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover; Title Page; Contents; Preface; Acknowledgments; Contributors; Chapter 1 Perspectives and State of the Art in Producing Solar Fuels and Chemicals from CO2; 1.1 Introduction; 1.1.1 GHG Impact Values of Pathways of CO2 Chemical Recycling; 1.1.2 CO2 Recycling and Energy Vectors; 1.2 Solar Fuels and Chemicals From CO2; 1.2.1 Routes for Converting CO2 to Fuels; 1.2.2 H2 Production Using Renewable Energy; 1.2.3 Converting CO2 to Base Chemicals; 1.2.4 Routes to Solar Fuels; 1.3 Toward Artificial Leaves; 1.3.1 PEC Cells for CO2 Conversion; 1.4 Conclusions; Acknowledgments; References Chapter 2 Transformation of Carbon Dioxide to Useable Products Through Free Radical-Induced Reactions2.1 Introduction; 2.1.1 Background; 2.2 Chemical Reduction of CO2; 2.2.1 Photochemical Reduction of CO2; 2.2.2 Electrochemical Reduction of CO2; 2.3 Conclusions; Acknowledgments; References; Chapter 3 Synthesis of Useful Compounds from CO2; 3.1 Introduction; 3.2 Photochemical Reduction; 3.3 Electrochemical Reduction; 3.4 Electrocatalytic Reduction; 3.4.1 Transition Metal Nanoparticle Catalysts; 3.4.2

Coordination Complexes; 3.4.3 Enzymes; 3.5 CO2 Hydrogenation; 3.5.1 Active Phases
3.5.2 Products of CO2 Hydrogenation3.5.3 Deactivation and Regeneration; 3.5.4 Mechanisms of CO2 Hydrogenation; 3.6 CO2 Reforming; 3.7 Prospects in CO2 Reduction; Acknowledgments; References; Chapter 4 Hydrogenation of Carbon Dioxide to Liquid Fuels; 4.1 Introduction; 4.2 Methanation of Carbon Dioxide; 4.3 Methanol and Higher Alcohol Synthesis by CO2 Hydrogenation; 4.4 Hydrocarbons Through Modified Fischer-Tropsch Synthesis; 4.5 Conclusions; References; Chapter 5 Direct Synthesis of Organic Carbonates from CO2 and Alcohols Using Heterogeneous Oxide Catalysts; 5.1 Introduction
5.2 Ceria-Based Catalysts5.2.1 Choice of Ceria Catalysts in Direct DMC Synthesis; 5.2.2 Performances of the Ceria Catalyst in DMC Synthesis; 5.2.3 Direct Synthesis of Various Organic Carbonates from Alcohols and CO2 Without Additives; 5.2.4 Reaction Mechanism; 5.2.5 Ceria-Zirconia Catalysts; 5.2.6 Modification of Ceria-Based Catalysts; 5.2.7 Use of Acetonitrile as a Dehydrating Agent for DMC Synthesis; 5.2.8 Use of Acetonitrile as Dehydrating Agent for Synthesis of Various Carbonates; 5.2.9 Use of Benzonitrile as Dehydrating Agent
5.2.10 Deactivation of the Ceria Catalyst in the Presence of Benzonitrile5.2.11 Use of Other Dehydrating Agents; 5.3 Zirconia-Based Catalysts; 5.3.1 Structure and Catalytic Performance of Zirconia; 5.3.2 Modification of Zirconia Catalysts; 5.3.3 Reaction Mechanism over Zirconia-Based Catalysts; 5.3.4 Combination of Dehydrating Agents with Zirconia-Based Catalysts; 5.4 Other Metal Oxide Catalysts; 5.5 Conclusions and Outlook; References; Chapter 6 High-Solar-Efficiency Utilization of CO2: the STEP (Solar Thermal Electrochemical Production) of Energetic Molecules; 6.1 Introduction
6.2 Solar Thermal Electrochemical Production of Energetic Molecules: an Overview

Sommario/riassunto

Recycling carbon-dioxide at the source would not only go a long way towards minimizing the emissions, but would also motivate industry leaders to take the positive approach for CO2 reuse. Transforming Carbon Dioxide into Synthetic Fuels presents power plant engineers, process engineers, chemical engineers, electrochemists, scientists, and professors with several technologies that can be used to recycle carbon-dioxide into fossil fuel equivalent and minimize carbon dioxide emissions. The authors demonstrate how to make these conversions from alternative green energy sources, such as sola