

1. Record Nr.	UNINA9910808632903321
Titolo	Process intensification for sustainable energy conversion // edited by Fausto Gallucci and Martin van Sint Annaland
Pubbl/distr/stampa	Chichester, England : , : Wiley, , 2015 ©2015
ISBN	1-118-44937-1 1-118-44939-8
Descrizione fisica	1 online resource (408 p.)
Disciplina	660/.28
Soggetti	Chemical processes Renewable energy sources Green chemistry
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; Copyright; Contents; Preface; List of Contributors; Chapter 1 Introduction; References; Chapter 2 Cryogenic CO2 Capture; 2.1 Introduction-CCS and Cryogenic Systems; 2.1.1 Carbon Capture and Storage; 2.1.2 Cryogenic separation; 2.2 Cryogenic Packed Bed Process Concept; 2.2.1 Capture Step; 2.2.2 CO2 Recovery Step; 2.2.3 H2O Recovery and Cooling Step; 2.3 Detailed Numerical Model; 2.3.1 Model Description; 2.3.2 Simulation Results; 2.3.3 Simplified Model: Sharp Front Approach; 2.3.4 Model Description; 2.3.5 Process Analysis; 2.3.6 Initial Bed Temperature 2.3.7 CO2 Inlet Concentration 2.3.8 Inlet Temperature; 2.3.9 Bed Properties; 2.4 Small-Scale Demonstration (Proof of Principle); 2.4.1 Results of the Proof of Principle; 2.5 Experimental Demonstration of the Novel Process Concept in a Pilot-Scale Set-Up; 2.5.1 Experimental Procedure; 2.5.2 Experimental Results; 2.5.3 Simulations for the Proof of Concept; 2.5.4 Radial Temperature Profiles; 2.5.5 Influence of the Wall; 2.6 Techno-Economic Evaluation; 2.6.1 Process Evaluation; 2.6.2 Parametric Study; 2.6.3 Comparison with Absorption and Membrane Technology; 2.7 Conclusions

2.8 Note for the Reader; List of symbols; Greek letters; Subscripts; References; Chapter 3 Novel Pre-Combustion Power Production: Membrane Reactors; 3.1 Introduction; 3.2 The Membrane Reactor Concept; 3.3 Types of Reactors; 3.3.1 Packed Bed Membrane Reactors; 3.3.2 Fluidized Bed Membrane Reactors; 3.3.3 Membrane Micro-Reactors; 3.4 Conclusions; 3.5 Note for the reader; References; Chapter 4 Oxy Fuel Combustion Power Production Using High Temperature O₂ Membranes; 4.1 Introduction; 4.2 MIEC Perovskites as Oxygen Separation Membrane Materials for the Oxy-fuel Combustion Power Production
4.3 MIEC Membrane Fabrication
4.4 High-temperature ceramic oxygen separation membrane system on laboratory scale; 4.4.1 Oxygen permeation measurements and sealing dense MIEC ceramic membranes; 4.4.2 $BaxSr_{1-x}Co_{1-x}FeyO_{3-}$ and $LaxSr_{1-x}Co_{1-y}FeyO_{3-}$ Membranes; 4.4.3 Chemical Stability of Perovskite Membranes Under Flue-Gas Conditions; 4.4.4 CO₂-Tolerant MIEC Membranes; 4.5 Integration of High-Temperature O₂ Transport Membranes into Oxy-Fuel Process: Real World and Economic Feasibility; 4.5.1 Four-End and Three-End Integration Modes; 4.5.2 Pilot-Scale Membrane Systems
4.5.3 Further Scale-Up of O₂ Production Systems
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5.4.3 Comparison between CLC in packed beds and circulated fluidized beds

Sommario/riassunto

This book addresses the application of process intensification to sustainable energy production, combining two very topical subject areas. Due to the increasing process of petroleum, sustainable energy production technologies must be developed, for example bioenergy, blue energy, chemical looping combustion, concepts for CO₂ capture etc. Process intensification offers significant competitive advantages, because it provides more efficient processes, leading to outstanding cost reduction, increased productivity and more environment-friendly processes.
