

Sustainable Pathways Toward Hydrogen and Synthetic Fuels 2022

Topical Conference at the 2022 AIChE Annual Meeting

Phoenix, Arizona, USA
13-18 November 2022

ISBN: 978-1-7138-7917-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2022) by AIChE
All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact AIChE
at the address below.

AIChE
120 Wall Street, FL 23
New York, NY 10005-4020

Phone: (800) 242-4363
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

SUSTAINABLE PATHWAYS TO CLEAN HYDROGEN AND SYNTHETIC FUELS I

288a Integration of Green Hydrogen Value Chains for Energy-Intensive Industries with Wider Energy Systems: Whole-Systems Modelling and Optimisation	1
<i>Sheila Samsatli, Nouri John Samsatli</i>	
288b Safety and Security Analysis of a Potential Remote Offshore Green Hydrogen Production.....	3
<i>Ahmed Elkady, Faisal Khan, Mahmoud El-Halwagi, Moustafa Ali</i>	
288c Modeling the Impact of Degradation on the Cost of Low-Temperature Electrolytic Hydrogen Production	5
<i>Landon Schofield, Benjamin Paren, Doo Hyun Mark Chung, Yang Shao-Horn, Dharik Mallapragada</i>	
288d Solar Thermochemical Water Splitting Using Iron Aluminates.....	7
<i>Kent J. Warren, Justin Tran, Alan Weimer</i>	
288e Crystal Features Controlling Oxygen Vacancy Formation in ABO ₃ Perovskites.....	8
<i>Robert Wexler, Gopalakrishnan Sai Gautam, Ellen B. Stechel, Emily Carter</i>	
288f Aldehydes Oxidation-Assisted H ₂ Production at High Current Densities Promoted By a Cooperative Catalyst	9
<i>Yue Chen, Yang Hou</i>	

SUSTAINABLE PATHWAYS TO CLEAN HYDROGEN AND SYNTHETIC FUELS II

353a Closing the Carbon Cycle in the Shipping Industry.....	10
<i>Margarita Charalambous, Valentina Negri, Valentin Kamm, Gonzalo Guillén-Gosálbez</i>	
353b Economic and Environmental Assessment of Fischer-Tropsch Electro-Diesel from Captured CO ₂	13
<i>Juan D. Medrano-García, Margarita Charalambous, Gonzalo Guillén-Gosálbez</i>	
353c Modeling of an Integrated Fischer-Tropsch Process with Energy Supplied By a Nuclear Power Plant.....	15
<i>Guiyan Zang, Pingping Sun, Hernan E. Delgado, Vincenzo Cappello, Clarence Ng, Amgad Elgowainy</i>	
353d A Technoeconomic Assessment of Liquid Green Hydrogen Carrier Supply Chains for Delivering Sustainable Fuel.....	16
<i>Bradie S. Crandall, Todd Brix, Robert Weber, Feng Jiao</i>	
353e Thermal Hydrolysis of Solid-State Sodium Borohydride	17
<i>Geo-Jong Kim, Hyun Tae Hwang</i>	
353f Performance of Cyclic Hydrogenation and Dehydrogenation of Benzyltoluene As Liquid Organic Hydrogen Carrier (LOHC).....	18
<i>Timo Rüde, Patrick Preuster, Moritz Wolf, Peter Wasserscheid</i>	

SUSTAINABLE PATHWAYS TO CLEAN HYDROGEN AND SYNTHETIC FUELS III

421a Economic Optimization of Grid-Integrated Clean Hydrogen and Ammonia Production	22
<i>Matthew Palys, Prodromos Daoutidis</i>	
421b Comparative Techno-Economic and Life Cycle Analysis of Conventional Ammonia with Carbon-Capture and Low-Carbon Hydrogen-Based Ammonia.....	24
<i>Kyuha Lee, Xinyu Liu, Pradeep Vyawahare, Pingping Sun, Amgad Elgowainy, Michael Wang</i>	
421c Techno-Economic Optimization of a Microwave-Assisted, Low-Pressure Ammonia Synthesis Process with Novel Separation Technologies	25
<i>Opeyemi Ogunniyan, Chirag Mevawala, Md Emdadul Haque, Yuxin Wang, Debangsu Bhattacharyya, Jianli Hu</i>	
421d Influence of Reductant Composition on NH ₃ Synthesis from Exhaust NO Gas Using NO-CO-H ₂ O-H ₂ Reaction	27
<i>Anthony Hamzah, Hideyuki Matsumoto, Yuichi Manaka, Tetsuya Nanba</i>	

SUSTAINABLE PATHWAYS TO CLEAN HYDROGEN AND SYNTHETIC FUELS IV

529a Techno-Economic Evaluation of Carbon-Negative Hydrogen Production from Biomass.....	30
<i>Mohammad Ostadi, Leslie Bromberg, Daniel R. Cohn, Emre Gençer</i>	
529b Hydrogen Production By Methane-Biomass Co-Pyrolysis	31
<i>Haiyan Guo</i>	
529c Insights into Gas-Phase Methane Pyrolysis for Hydrogen Production and Carbon Capture	32
<i>Patrick Lott, Manas B. Mokashi, Akash B. Shirsath, Heinz Müller, Corina Janzer, Steffen Tischer, Lubow Maier, Olaf Deutschmann</i>	
529d Methane Decarbonization for Hydrogen and Sequestered Carbon Nanofiber Co-Product	34
<i>Jessica Hauck, Kent J. Warren, Linfei Li, Mija H. Hubler, Boning Wang, Andrew Broerman, Samantha Harshberger, Theodore Champ, Alan Weimer</i>	
529e Microwave-Assisted Dry Reforming of Methane.....	35
<i>Sagar Sourav, Cong Wang, Weiqing Zheng, Dionisios Vlachos</i>	

Author Index