

# International Journal of HYDROGEN ENDERGY

Editor-in-Chief:

Senior Associate Editor:

Associate Editors:

Assistant Editors:

Emre A. Veziroğlu

J.W. Sheffield

A. Basile, M.B. Gorensek,

E.C. Kumbur and N.Z. Muradov

F. Chen, S.L. Garrison, J. Gong,

M.D. Mat and D.P. Mishra





Available online at www.sciencedirect.com

**ScienceDirect** 

# HYDROGEN ENERGY



Volume 39, Issue 1 2014

## **Regular Articles**

### **Environmental Impact**

_		
C. Acar and I. Dincer	1	Comparative assessment of hydrogen production methods from renewable and non-renewable sources
CC. Cormos	13	Techno-economic and environmental evaluations of large scale gasification-based CCS project in Romania
Electrolysis/Electrolyzers		
R. Peach, H.M. Krieg, A.J. Krüger, D. van der Westhuizen, D. Bessarabov and J. Kerres	28	Comparison of ionically and ionical-covalently cross-linked polyaromatic membranes for $\mathrm{SO}_2$ electrolysis
A. Allagui, S. Sarfraz, S. Ntais, F. Al momani and E.A. Baranova	41	Electrochemical behavior of ammonia on Ni <sub>98</sub> Pd <sub>2</sub> nano-structured catalyst
B. Bensmann, R. Hanke-Rauschenbach and K. Sundmacher	49	In-situ measurement of hydrogen crossover in polymer electrolyte membrane water electrolysis
<b>Chemical Thermochemical Hydrog</b>	en	
J. Park, J.H. Cho, H. Jung, KD. Jung and I. Moon	54	Exergy analysis of a simulation of the sulfuric acid decomposition process of the SI cycle for nuclear hydrogen production
D.S. MALLAPRAGADA and R. AGRAWAL	62	Limiting and achievable efficiencies for solar thermal hydrogen production
H. OZCAN and I. DINCER	76	Performance investigation of magnesium-chloride hybrid thermochemical cycle for hydrogen production
N. Tanaka, K. Onuki and S. Kubo	86	Effect of sulfuric acid on electro-electrodialysis of HIx solution
Solar Hydrogen		
H. Wang, W. Zhu, B. Chong and K. Qin	90	Improvement of photocatalytic hydrogen generation from CdSe/CdS/TiO $_2$ nanotube-array coaxial heterogeneous structure
H. SARGSYAN, L. GABRIELYAN and A. TRCHOUNIAN	100	Concentration-dependent effects of metronidazole, inhibiting nitrogenase, on hydrogen photoproduction and proton-translocating ATPase activity of <i>Rhodobacter sphaeroides</i>
G. ZINI and A. DALLA ROSA	107	Hydrogen systems for large-scale photovoltaic plants: Simulation with

forecast and real production data

Contents continued on inside back cover

Indexed/Abstracted in: Chemical Abstracts (Online), Chemical Engineering and Biotechnology Abstracts (Online), Chimica, Compendex, Currents Abstracts, Current Contents, EnCompassLit, Energy & Power Source, Engineering Index, Environment Complete, Environment Index, International Building Services Abstracts, Inspec, PubMed, Referativnyi Zhurnal, Russian Academy of Sciences Bibliographies, Science Citation Index Expanded, TEMA-Technology and Management, Web of Science, Also covered in the abstract and citation database SCOPUS®. Full text available on ScienceDirect®.

ISSN 0360-3199





J. Ding, W. Yan, S. Sun, J. Bao and C. Gao	119	Fabrication of graphene/ $CaIn_2O_4$ composites with enhanced photocatalytic activity from water under visible light irradiation
CM. Wu, R. Peng, N.M. Dimitrijevic, T. Rajh and R.T. Koodali	127	Preparation of TiO <sub>2</sub> –SiO <sub>2</sub> aperiodic mesoporous materials with controllable formation of tetrahedrally coordinated Ti <sup>4+</sup> ions and their performance for photocatalytic hydrogen production
Bio Hydrogen		
S.C. Emerson, T. Zhu, T.D. Davis, A. Peles, Y. She, R.R. Willigan, T.H. Vanderspurt, M. Swanson and D.A. Laudal	137	Liquid phase reforming of woody biomass to hydrogen
D. Yang, Y. Zhang, D.K. Barupal, X. Fan, R. Gustafson, R. Guo and O. Fiehn	150	Metabolomics of photobiological hydrogen production induced by CCCP in <i>Chlamydomonas reinhardtii</i>
T. Pairojpiriyakul, W. Kiatkittipong, S. Assabumrungrat and E. Croiset	159	Hydrogen production from supercritical water reforming of glycerol in an empty Inconel 625 reactor
J. Remón, F. Broust, J. Valette, Y. Chhiti, I. Alava, A.R. Fernandez-Akarregi, J. Arauzo and L. Garcia	171	Production of a hydrogen-rich gas from fast pyrolysis bio-oils: Comparison between homogeneous and catalytic steam reforming routes
J. Lin, T.A. Trabold, M.R. Walluk and D.F. Smith	183	Bio-fuel reforming for solid oxide fuel cell applications. Part 2: Biodiesel
J. Lin, T.A. Trabold, M.R. Walluk and D.F. Smith	196	Bio-fuel reformation for solid oxide fuel cell applications. Part 3: Biodiesel-diesel blends
E. Kraleva, S. Sokolov, G. Nasillo, U. Bentrup and H. Ehrich	209	Catalytic performance of CoAlZn and NiAlZn mixed oxides in hydrogen production by bio-ethanol partial oxidation
XB. Wu, GF. Huang, LP. Bai, MN. Long and QX. Chen	221	Enhanced hydrogen production from xylose and bamboo stalk hydrolysate by overexpression of xylulokinase and xylose isomerase in <i>Klebsiella oxytoca</i> HP1
P.A. Luppi, L. Nieto Degliuomini, M.P. García and M.S. Basualdo	231	Fault-tolerant control design for safe production of hydrogen from bio-ethanol
S.R. Shanmugam, S.R. Chaganti, J.A. Lalman and D.D. Heath	249	Effect of inhibitors on hydrogen consumption and microbial population dynamics in mixed anaerobic cultures
Methanol Hydrogen		
Y. Ma, G. Guan, C. Shi, A. Zhu, X. Hao, Z. Wang, K. Kusakabe and A. Abudula	258	Low-temperature steam reforming of methanol to produce hydrogen over various metal-doped molybdenum carbide catalysts
Catalysts/Electrocatalysts		
HJ. Zhang, H. Li, X. Li, H. Qiu, X. Yuan, B. Zhao, ZF. Ma and J. Yang	267	Pyrolyzing cobalt diethylenetriamine chelate on carbon (CoDETA/C) as a family of non-precious metal oxygen reduction catalyst
H. Zhang, Y.A. Alhamed, Y. Kojima, A.A. Al-Zahrani, H. Miyaoka and L.A. Petrov	277	Structure and catalytic properties of Ni/MWCNTs and Ni/AC catalysts for hydrogen production via ammonia decomposition
Y. REN, S. ZHANG and H. LI	288	Electro-oxidation of methanol on $\mathrm{SnO}_2$ -promoted Pd/MWCNTs catalysts in alkaline solution
S. Appari, V.M. Janardhanan, R. Bauri and S. Jayanti	297	Deactivation and regeneration of Ni catalyst during steam reforming of model biogas: An experimental investigation
N.A.M. Barakat, M. Motlak, A.A. Elzatahry, K.A. Khalil and E.A.M. Abdelghani	305	$Ni_xCo_{1-x}$ alloy nanoparticle-doped carbon nanofibers as effective non-precious catalyst for ethanol oxidation

Contents	continued	from	inside	back	cover
Contents	continued	from	inside	back	cove

C. Chen, C. Ruan, Y. Zhan, X. Lin, Q. Zheng and K. Wei	317	The significant role of oxygen vacancy in Cu/ZrO <sub>2</sub> catalyst for enhancing water-gas-shift performance
Methane Hydrogen		
V.A. Vorontsov, A.G. Gribovskiy, L.L. Makarshin, D.V. Andreev, V.Y. Ylianitsky and V.N. Parmon	325	Influence of a reaction mixture streamline on partial oxidation of methane in an asymmetric microchannel reactor
Syngas		
V.B. SILVA and A. ROUBOA	331	Predicting the syngas hydrogen composition by using a dual stage equilibrium model
Hydrogen Distribution		
N. JHAVERI, B. MOHANTY and S. KHANAM	339	Mathematical modeling and optimization of hydrogen distribution network used in refinery
Storage		
JH. Shim, M. Park, Y.H. Lee, S. Kim, Y.H. Im, JY. Suh and Y.W. Cho	349	Effective thermal conductivity of MgH <sub>2</sub> compacts containing expanded natural graphite under a hydrogen atmosphere
R. Jin, G. Li, Y. Xu, J. Liu and G. Chen	356	Uniform Bi <sub>2</sub> S <sub>3</sub> nanorods-assembled hollow spheres with excellent electrochemical hydrogen storage abilities
C.J. WEBB and E.MACA. GRAY	366	Analysis of the uncertainties in gas uptake measurements using the Sieverts method
S.M. Lyth, H. Shao, J. Liu, K. Sasaki and E. Akiba	376	Hydrogen adsorption on graphene foam synthesized by combustion of sodium ethoxide
C. Hu, J.K. Pulleri, SW. Ting and KY. Chan	381	Activity of Pd/C for hydrogen generation in aqueous formic acid solution
D. SILAMBARASAN, V.J. SURYA, K. IYAKUTTI and V. VASU	391	Single-step preparation and hydrogenation of single walled carbon nanotubes-titanium dioxide composite
P. Matysik, T. Czujko and R.A. Varin	398	The application of Pettifor structure maps to binary metal hydrides
Portable Hydrogen		
J. Manna, B. Roy, M. Vashistha and P. Sharma	406	Effect of Co <sup>+2</sup> /BH <sub>4</sub> <sup>-</sup> ratio in the synthesis of Co–B catalysts on sodium borohydride hydrolysis
S.S. Muir, Z. Chen, B.J. Wood, L. Wang, G.Q.(Max) Lu and X. Yao	414	New electroless plating method for preparation of highly active Co-B catalysts for NaBH <sub>4</sub> hydrolysis
N. Cao, J. Su, W. Luo and G. Cheng	426	Hydrolytic dehydrogenation of ammonia borane and methylamine borane catalyzed by graphene supported Ru@Ni core-shell nanoparticles
F. Qiu, Y. Dai, L. Li, C. Xu, Y. Huang, C. Chen, Y. Wang, L. Jiao and H. Yuan	436	Synthesis of Cu@FeCo core—shell nanoparticles for the catalytic hydrolysis of ammonia borane
L. Yu, P. Pellechia and M.A. Matthews	442	Kinetic models of concentrated NaBH <sub>4</sub> hydrolysis
PE Fuel Cells		
T. Berning	449	A method for the <i>ad hoc</i> and real-time determination of the water balance in a PEMFC
J. Cho, H. Oh, J. Park, K. Min, E. Lee and JY. Jyoung	459	Effect of the micro porous layer design on the dynamic performance of a proton exchange membrane fuel cell

### Contents continued from bm XII

Y. DING, X.T. BI and D.P. WILKINSON	469	Numerical investigation of the impact of two-phase flow maldistribution on PEM fuel cell performance
M. Jouin, R. Gouriveau, D. Hissel, MC. Péra and N. Zerhouni	481	Prognostics of PEM fuel cell in a particle filtering framework
J. Cho, H. Oh, J. Park, K. Min, E. Lee and JY. Jyoung	495	Study on the performance of a proton exchange membrane fuel cell related to the structure design of a gas diffusion layer substrate
SO Fuel Cells		
S.P. JIANG and X. CHEN	505	Chromium deposition and poisoning of cathodes of solid oxide fuel cells – A review
B. JIANG, N. WANG and L. WANG	532	Parameter identification for solid oxide fuel cells using cooperative barebone particle swarm optimization with hybrid learning
N. Jaiswal, S. Upadhyay, D. Kumar and O. Parkash	543	Sm³+ and Sr²+ co-doped ceria prepared by citrate-nitrate auto-combustion method
M. Halinen, O. Thomann and J. Kiviaho	552	Experimental study of SOFC system heat-up without safety gases
S. Yu, H. Chen, R. Li, H. Dai, S. He and L. Guo	562	Optimization of electrochemical performance of Ca <sub>3</sub> Co <sub>2</sub> O <sub>6</sub> cathode on yttria-stabilized zirconia electrolyte for intermediate temperature solid oxide fuel cells
Transportation		
I. LACHHAB and L. KRICHEN	571	An improved energy management strategy for FC/UC hybrid electric vehicles propelled by motor-wheels
E. ROTHUIZEN and M. ROKNI	582	Optimization of the overall energy consumption in cascade fueling stations for hydrogen vehicles
Combustion		
K. Dharamshi, D.K. Srivastava and A.K. Agarwal	593	Combustion characteristics and flame-kernel development of a laser ignited hydrogen-air mixture in a constant volume combustion chamber
J. MIAO, C.W. LEUNG and C.S. CHEUNG	602	Effect of hydrogen percentage and air jet Reynolds number on fuel lean flame stability of LPG-fired inverse diffusion flame with hydrogen enrichment
Properties		
G. Zhang, S. Dou, Y. Lu, Y. Shi, X. Lai and X. Wang	610	Mechanisms for adsorption, dissociation and diffusion of hydrogen in hydrogen permeation barrier of $\alpha$ -Al <sub>2</sub> O <sub>3</sub> : The role of crystal orientation
Safety/Sensors		
DT. PHAN and GS. CHUNG	620	Characteristics of resistivity-type hydrogen sensing based on palladium-graphene nanocomposites
S. Nasirian and H. Milani Moghaddam	630	Hydrogen gas sensing based on polyaniline/anatase titania nanocomposite
Comments & Responses		
W. Seifritz	643	Comments on "Thermal cracking of methane into hydrogen for a CO <sub>2</sub> —Free utilization of natural gas" by A. Abanades, C. Rubbia and D. Salmieri, International Journal of Hydrogen Energy, 2013; 38: 8491–8496
A. Abánades	645	Response to Dr. Walter Seifritz's comments on the manuscript: "Thermal cracking of methane into hydrogen for a CO <sub>2</sub> —Free utilization of natural gas" by Abánades et al., Int J Hydrogen Energy, 2013; 38: 8491–8496