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ABSTRACT BOOK

EDITORS
İbrahim DİNÇER
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Hilmi YURDAKUL
Kadir AYDIN

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SCIENTIFIC PROGRAM

March 16, 2018

HALL - A	
09:30-10:15	**Keynote Speaker: Bruno G. Pollet** **Current Status of Hydrogen and Fuel Cells in Norway** **Chair: Richard Baker**
10:15-10:30	**Coffee Break**
10:30-12:00	**Session 3A: Thermodynamic Analysis of Hydrogen Technologies** **Chair: Güngör Tuncer**
10:30-10:45	**(0044) Thermodynamic and Economic Analyses of a Renewable Energy Based Hydrogen Production System** Fatih Sorgulu, Ibrahim Dincer
10:45-11:00	**(0047) Thermodynamic Performance Assessment of Integrated Solar Energy System with Hydrogen Production** Fatih Yilmaz, Murat Ozturk, Resat Selbas
11:15-11:30	**(0064) Geothermal and Solar Driven Multigeneration System for Sustainable Buildings: A Thermodynamic Analysis** Tahir Abdul Hussain Ratlamwala, Hamed Alimoradiyan
11:30-11:45	**(0184) Thermodynamic Analysis of a New Solar Power Tower Based Integrated System for Hydrogen Production and Liquefaction** Yunus Emre Yuksel, Murat Ozturk, Ibrahim Dincer
11:45-12:00	**(0221) Thermodynamic Analysis of a Unique Integrated Photoelectrochemical System for Multigeneration Purposes** Canan Acar, Ibrahim Dincer
12:00-13:30	**LUNCH**

HALL - B	
10:30-12:00	**Session 1B: Exergy Analysis of Hydrogen Energy Systems** **Chair: Hikmet Karakoc**
10:30-10:45	**(0096) Diagnosis and Improvement of Hydrogen Demand/Supply Processes using Combined Pinch and Exergy Analysis** Fatma Alyer, Zehra Özçelik
10:45-11:00	**(0023) Optimum Energy and Life Cycle Cost Evalautaion of an Advanced Hydrogen Liquefaction Cycle Using Geothermal Power** Ceyhun Yılmaz
11:00-11:15	**(0065) Energy and Exergy Analyses of a Novel Ammonia Combined Power Plant Operating with a Gas Turbine and a Solid Oxide Fuel Cell** Muhammad Ezzat, Ibrahim Dincer
11:15-11:30	**(0079) A Parametric Study of the Performance of a Polymer Electrolyte Membrane Electrolyzer: Energy and Exergy Analyses** Ehsan Baniasadi, Ebrahim Afshari, Faeze Moradi Nafchi, Nader Javani
11:30-11:45	**(0041) Exergoeconomic Analysis and Optimization of a Concentrated Sunlight-based Integrated Photoelectrochemical Hydrogen and Ammonia Production System** Yusuf Bicer, Ibrahim Dincer
12:00-13:30	**LUNCH**

[**Abstract:0218**]

Highly Effective PVP-stabilized Rh-Ru Bimetallic Nanoparticles for the Dehydrogenation of Methylamine-borane in Water

Mehmet Gülcan*, *Yaşar Karataş

Van Yüzüncü Yıl University, Faculty of Science, Department of Chemistry, Tuşba-Van Turkey

Methylamine-borane (CH3NH2-BH3, MeAB) is an ammonia-borane derivative and it has been studied in hydrolysis reaction over the past years due to its very high hydrogen density of 11.1%. According to the eqn (1), 3 moles of hydrogen can be obtained from the dehydrogenation of MeAB in water per mole MeAB in the presence of a suitable catalyst, which is considered to be a more advantageous method when compared to other systems that produce hydrogen using MeAB such as thermolysis and non-aqueous catalytic dehydrogenation (Gülcan and Karataş, 2017; Staubitz et al. 2010; Yang et al. 2012).

In the current work, we aimed to prepare and characterize PVP-stabilized Rh-Ru bimetallic nanoparticles and to use them as an highly effective catalyst for dehydrogenation of MeAB in water at room temperature. The PVP-stabilized Rh-Ru bimetallic nanoparticles were synthesized using a classical alcohol reduction method (Gülcan and Karataş, 2017) and characterized by using TEM, HR-TEM, TEM/EDX, P-XRD, UV/Vis and XPS techniques.

Keywords: Nanoparticles, methylamine-borane, PVP, dehydrogenation, rhodium, ruthenium

[**Abstract:0221**]

Thermodynamic Analysis of a Unique Integrated Photoelectrochemical System for Multigeneration Purposes

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Hydrogen is a highly versatile energy carrier that may become one of the key pillars to support the future CO2-free energy infrastructure. When used in fuel cells, H2 is converted to water and it gives little or zero exhaust of greenhouse gases. For H2 economy to succeed, it needs to be produced in a clean, sustainable, reliable, and feasible way. The main objective of this study is to develop and investigate a continuous type hybrid photoelectrochemical-chloralkali H2 production reactor that converts the by–products into useful industrial commodities (i.e., Cl2 and NaOH). This system maximizes solar spectrum use by taking advantage of photocatalysis and PV/T. Furthermore, by using electrodes as electron donors to drive the photochemical reaction, the potential of pollutant emissions are minimized. The final products of this novel integrated system can be listed as H2, Cl2, NaOH, heat, and electricity. In this study, the effects of operating temperature on H2, Cl2, heat, and electricity production, energy and exergy efficiencies, and exergy destruction rates are presented.

Keywords: Exergy, efficiency, hydrogen, multigeneration, sustainability, solar energy