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**Hicham Idriss
Heli Wang**
Editors

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Contents

vii	Conference Committee
ix	Introduction

PHOTOCATALYSTS FOR SOLAR HYDROGEN

7770 06	Electrochemical and photocatalytic properties of TiO₂/WO₃ photoelectrodes [7770-05] H. G. Oliveira, E. D. Silva, C. Longo, State Univ. of Campinas (Brazil)
---------	---

PHOTOCATALYSIS AT TITANIUM OXIDES

7770 07	Structural environment of nitrogen in n-doped rutile TiO₂ (110) (Invited Paper) [7770-06] M. A. Henderson, V. Shutthanandan, T. Ohsawa, S. A. Chambers, Pacific Northwest National Lab. (United States)
---------	--

BANDGAP ENGINEERING AND MODELING OF SEMICONDUCTORS AND SEI

7770 0C	Band structure engineering of ZnO_{1-x}Se_x alloys [7770-47] M. A. Mayer, D. T. Speaks, Lawrence Berkeley National Lab. (United States) and Univ. of California, Berkeley (United States); K. M. Yu, Lawrence Berkeley National Lab. (United States); S. S. Mao, E. E. Haller, Univ. of California, Berkeley (United States) and Lawrence Berkeley National Lab. (United States); W. Walukiewicz, Lawrence Berkeley National Lab. (United States)
7770 0E	Ab initio modeling of water-semiconductor interfaces for direct solar-to-chemical energy conversion [7770-12] B. C. Wood, T. Ogitsu, E. Schwegler, Lawrence Livermore National Lab. (United States)
7770 0F	Delafossite-alloy photoelectrodes for PEC hydrogen production: a density functional theory study (Invited Paper) [7770-13] M. N. Huda, The Univ. of Texas at Arlington (United States); Y. Yan, National Renewable Energy Lab. (United States); A. Walsh, Univ. College London (United Kingdom); S.-H. Wei, J. A. Turner, M. M. Al-Jassim, National Renewable Energy Lab. (United States)

NANOSTRUCTURES AND QD

7770 0G	Controlling photo-activity of solution-processed hematite electrodes for solar water splitting (Invited Paper) [7770-14] K. Sivula, J. Brillet, M. Grätzel, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
7770 0I	Photocatalytic water splitting with nano-K₄Nb₆O₁₇ [7770-16] T. K. Townsend, E. M. Sabio, Univ. of California, Davis (United States); N. D. Browning, Univ. of California, Davis (United States) and Lawrence Livermore National Lab. (United States); F. E. Osterloh, Univ. of California, Davis (United States)

- 7770 0K **Nanostructuring MoS₂ for photoelectrochemical water splitting (Invited Paper)** [7770-18]
Z. Chen, J. Kibsgaard, T. F. Jaramillo, Stanford Univ. (United States)

CHARACTERIZATION

- 7770 0M **In situ EPR studies of hole and electron trapping in oxide photocatalysts (Invited Paper)** [7770-20]
I. R. Macdonald, R. F. Howe, Univ. of Aberdeen (United Kingdom)

WATER SPLITTING AND SOLAR FUELS

- 7770 0R **Catalytic conversion of carbon dioxide to methanol and higher order alcohols at a photoelectrochemical interface (Invited Paper)** [7770-25]
K. Keets, A. Morris, E. Zeitler, P. Lakkaraju, A. Bocarsly, Princeton Univ. (United States)

PHOTOCATALYSIS AT METAL OXIDES

- 7770 0S **Influence of point defects on the performance of InVO₄ photoanodes (Invited Paper)** [7770-26]
R. van de Krol, J. Ségalini, C. S. Enache, Delft Univ. of Technology (Netherlands)
- 7770 0V **Status of research on tungsten oxide-based photoelectrochemical devices at the University of Hawai'i (Invited Paper)** [7770-28]
N. Gaillard, Y. Chang, J. Kaneshiro, A. Deangelis, E. L. Miller, Univ. of Hawai'i (United States)

PHOTOELECTROCHEMICAL WATER SPLITTING

- 7770 0Z **Surface modification of a-SiC photoelectrodes for photocurrent enhancement** [7770-32]
I. Matulionis, J. Hu, F. Zhu, J. Gallon, MVSystems, Inc. (United States); N. Gaillard, Univ. of Hawaii at Monoa (United States); T. Deutsch, National Renewable Energy Lab. (United States); E. Miller, Univ. of Hawaii at Monoa (United States); A. Madan, MVSystems, Inc. (United States)

SOLAR HYDROGEN R&D AND SYSTEMS

- 7770 12 **QD co-sensitized and nitrogen doped TiO₂ nanocomposite for photoelectrochemical hydrogen generation (Invited Paper)** [7770-35]
J. Hensel, M. Canin, J. Z. Zhang, Univ. of California, Santa Cruz (United States)
- 7770 14 **Status of research and development on photoelectrochemical hydrogen production in Korea** [7770-37]
J. W. Kim, Hydrogen Energy R&D Ctr. (Korea, Republic of); J. S. Lee, Pohang Univ. of Science and Technology (Korea, Republic of); J.-O. Baeg, Korea Research Institute of Chemical Technology (Korea, Republic of)

ADVANCED PHOTOCATALYSTS

- 7770 16 **Hydrogen production by photoreaction of ethanol over Au/TiO₂ anatase: the effect of TiO₂ particle size (Invited Paper)** [7770-39]
A. M. Nadeem, Univ. of Auckland (New Zealand) and Univ. of Aberdeen and Robert Gordon Univ. (United Kingdom); G. I. N. Waterhouse, J. B. Metson, Univ. of Auckland (New Zealand); H. Idriss, Univ. of Aberdeen and Robert Gordon Univ. (United Kingdom)
- 7770 18 **Hetero-structured nano-photocatalysts fabricated by dynamic shadowing growth** [7770-41]
W. Smith, Y. Zhao, The Univ. of Georgia (United States)

POSTER SESSION

- 7770 1D **Preparation and photoelectrochemical characterization of GaN thin films for hydrogen production** [7770-49]
A. M. Fernández, Univ. Nacional Autónoma de México (Mexico); J. A. Turner, National Renewable Energy Lab. (United States)
- 7770 1E **Hydrogen generation by the reaction of oxide-modified aluminum powders with tap water** [7770-50]
H.-W. Wang, H.-W. Chung, Chung Yuan Christian Univ. (Taiwan)
- 7770 1F **Photoelectrochemical water splitting: silicon photocathodes for hydrogen evolution** [7770-51]
E. L. Warren, S. W. Boettcher, J. R. McKone, N. S. Lewis, California Institute of Technology (United States)

Author Index

Conference Committee

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Jin Zhong Zhang, University of California, Santa Cruz (United States)

Session Chairs

- 1 Photocatalysts for Solar Hydrogen
Hicham Idriss, University of Aberdeen (United Kingdom) and Robert Gordon University (United Kingdom)
- 2 Photocatalysis at Titanium Oxides
Jin Zhong Zhang, University of California, Santa Cruz (United States)

- 3 Bandgap Engineering and Modeling of Semiconductors and SEI
Michael A. Henderson, Pacific Northwest National Laboratory
(United States)
- 4 Nanostructures and QD
Lionel Vayssieres, National Institute for Materials Science (Japan)
- 5 Characterization
Jinghua Guo, Lawrence Berkeley National Laboratory (United States)
- 6 Water Splitting and Solar Fuels
Heli Wang, National Renewable Energy Laboratory (United States)
- 7 Photocatalysis at Metal Oxides
Nianqiang Wu, West Virginia University (United States)
- 8 Photoelectrochemical Water Splitting
Hicham Idriss, University of Aberdeen (United Kingdom) and Robert
Gordon University (United Kingdom)
- 9 Solar Hydrogen R&D and Systems
Yat Li, University of California, Santa Cruz (United States)
- 10 Advanced Photocatalysts I
Gunnar Westin, Uppsala Universitet (Sweden)
- 11 Advanced Photocatalysts II
Heli Wang, National Renewable Energy Laboratory (United States)

Introduction

This special issue is devoted to solar hydrogen production and the associated materials study. It contains 20 research contributions following the conference on Solar Hydrogen and Nanotechnology V that was composed of over 50 oral presentations. We would like to express our sincere thanks for the effort and input that all contributors have made into their presentations and subsequent discussions.

The contributions of this issue extend from polycrystalline to thin film and to single crystal studies by both experimental and computation methods. Most of the subjects dealt with water splitting to hydrogen. For water splitting most of the studies were conducted by photoelectrochemical methods using materials such as InVO_4 , $\text{ZnO}_{1-x}\text{Se}_x$, nitrogen doped TiO_2 together with quantum dots (such as CdSe and CdS), GaN thin film, nanostructured MoS_2 , $\text{InP}(100)$, Ti doped hematite electrodes and nano- $\text{K}_4\text{Nb}_6\text{O}_{17}$ among others. Other work was also devoted to conversion of CO_2 to hydrocarbons and of ethanol to hydrogen. Computation studies based on DFT mainly focused on band gap engineering and although the method is known to underestimate the materials band gap trends could still be seen and valuable information could be extracted. It was felt that this approach is a more rigorous one compared to combinatorial type of studies for the design and test of new materials.

Needless to say that many challenges are still ahead in order to find a stable and active photocatalytic material for making hydrogen from water. While CO_2 photocatalytic conversion is still in its infancy, this area of research is very attractive, in particular if coupled with water splitting providing the hydrogen to reduce CO_2 .

Hicham Idriss
Heli Wang