

Program & Book of Abstracts

KONAN GAKUEN 100th Anniversary

INTERNATIONAL

Scientific Symposium

Series2 | International Symposium on
Solar Energy Materials

*Sponsored by The Hirao Taro Foundation of
KONAN GAKUEN for Academic Research*

2019 **1/25** ^{FRI} **26** ^{SAT} iCommons
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Organized by

Faculty of Science and Engineering,
Konan University

Co-Organized by

JSPS KAKENHI, Innovations for
Light Energy Conversion (I4LEC)



Konan frontier research project on new
materials for creation of everlasting
energy systems based on sunlight

Welcome to the **International Symposium on Solar Energy Materials**

On behalf of the organizing committee, the chairperson of the International Symposium on Solar Energy Materials, which will be held on January 25-26, 2019, welcomes you in Kobe. The international symposium is one of the international symposiums to commemorate the 100th anniversary of KONAN GAKUEN and is sponsored by The Hirao Taro Foundation of KONAN GAKUEN for Academic Research.

The objective of the symposium is to provide a platform for lectures, presentations, and discussions on materials and systems relating to conversion and storage of solar energy. Utilization of solar energy is one of the most important and promising technologies for enabling sustainability of human society and environment, both of which are endamaged by the ever increasing exploitation of fossil fuels and, as a result, the surge of carbon dioxide content in the atmosphere. The contributions of the International Symposium cover a wide range of topics relating to conversion and storage of solar energy, which include newly developed solar cells, novel processes and materials for solar cells, methods and materials for conversion of solar energy into chemical energy, physical and chemical characterizations of photofunctional compounds, feature applications and aspects of photovoltaic systems. We, the organizing committee, believe that state-of-the-art research results and lively discussion will stimulate further international collaboration between researchers.

This program booklet incorporates abstracts of plenary, keynote, invited, and contributed ones, which are going to be presented at the International Symposium. We hope that all activities of the International Symposium will become both valuable and enjoyable.

A handwritten signature in black ink, appearing to read 'Shigeru Ikeda'.

Shigeru Ikeda
Symposium General Chair
Professor, Konan University

Lecture Program

as of Jan. 10, 2019

| Friday, January 25 | | | |
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| 13:00-13:05 | Opening | | |
| Chair: Takashi Minemoto | | | |
| 13:05-13:55 | PL-01 Plenary | <u>Shuji Hayase</u> (Kyushu Inst. of Tech., Japan) | Recent research progress on narrow band gap perovskite solar cells and Pb free perovskite solar cells |
| Break | | | |
| Session (A) Photovoltaic Materials | | | Chair: Yoshitaro Nose |
| 14:05-14:30 | IL-01 | <u>Takashi Minemoto</u> (Ritsumeikan Univ., Japan) | Lift-off technology to expand application of CuInSe ₂ based thin-film solar cells |
| 14:30-14:55 | IL-02 | Tooru Tanaka (Saga Univ., Japan) | Intermediate band solar cells based on highly-mismatched ZnTeO alloys |
| 14:55-15:20 | IL-03 | Xia Hao (Sichuan Univ., China) | The road to over 18% efficiency of CdTe solar cells |
| Break | | | |
| Chair: Shuji Hayase | | | |
| 15:35-16:15 | KL-01 Keynote | <u>Songyuan Dai</u> (North China Electric Power Univ., China) | Progress of perovskite solar cells in China |
| Session (B) Materials Physics & Chemistry (I) | | | Chair: Shigeru Ikeda |
| 16:15-16:40 | IL-04 | <u>Yoshitaro Nose</u> (Kyoto Univ., Japan) | Fabrication of ZnSnP ₂ -based photovoltaic device |
| 16:40-17:05 | IL-05 | <u>Atsushi Kimoto</u> (Konan Univ., Japan) | Multilayer organic photovoltaic devices fabricated by electrospray deposition technique |
| 17:05-18:30 | Poster Session | | |

| Saturday, January 26 | | | |
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| Chair: Yun Hau Ng | | | |
| 10:00-10:50 | PL-02 Plenary | Hynd Remita (Univ. of Paris-sud, France) | Conjugated polymer nanostructures for photocatalysis under visible-light |
| Break | | | |
| Session (C) Photocatalysis & Photoelectrochemistry | | | Chair: Shigeru Ikeda |
| 11:00-11:25 | IL-06 | Yun Hau Ng (City Univ. of Hong Kong, China) | Stabilizing solar hydrogen production using cuprous oxide |
| 11:25-11:50 | IL-07 | Osamu Tomita (Kyoto Univ., Japan) | Two-step water splitting under visible light by using transition-metal substituted polyoxometalate as shuttle redox mediator |
| 11:50-12:15 | IL-08 | Jiang Feng (South China Normal Univ., China) | Promising solar water splitting devices based on Cu ₂ ZnSnS ₄ photocathode protected by a HfO ₂ photocorrosion-resistant film |
| Break | | | |
| Session (D) Materials Physics & Chemistry (II) | | | Chair: Yasuaki Ishikawa |
| 13:30-13:55 | IL-09 | Kenji Yoshino (Univ. of Miyazaki, Japan) | ZnO thin films grown by spray pyrolysis and their PV applications |
| 13:55-14:20 | IL-10 | Shen Qing (The Univ. of Electro-Commun., Japan) | Colloidal synthesis of phase-stable and less-defect perovskite nanocrystals and application in solar cells |
| 14:20-14:45 | IL-11 | Takeaki Sakurai (Univ. of Tsukuba, Japan) | Study of recombination in thin-film Cu(In,Ga)(S,Se) ₂ solar cells |
| Session (E) Photovoltaic Systems | | | Chair: Takeaki Sakurai |
| 15:00-15:25 | IL-12 | Kensuke Nishioka (Univ. of Miyazaki, Japan) | Recent development of concentrator photovoltaic system and its applications for solar to chemical energy conversion |
| 15:25-15:50 | IL-13 | Taizo Masuda (Toyota Motor Corp., Japan) | Towards new mobility society using solar energy |
| 15:50-16:15 | IL-14 | Yasuaki Ishikawa (Nara Inst. Sci. Tech., Japan) | Detect of failures on Si photovoltaic modules |
| 16:15-16:30 | Closing | | |

Poster Presentation

as of Jan. 10, 2019

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| P-01 | Interfacial analysis via lift-off process for Cu(In,Ga)Se ₂ solar cells <u>Takahito Nishimura</u> , Mikiya Inoue, Atsuya Doi, Jakapan Chantana, Takashi Minemoto (<i>Ritsumeikan Univ.</i>) |
| P-02 | Characterization of Al-doped ZnCdO thin films on MgO substrate by molecular beam epitaxy <u>HyoChang Jang</u> , Kento Matsuo, Tooru Tanaka, Katsuhiko Saito, Qixin Guo (<i>Saga Univ.</i>) |
| P-03 | Mg(Mg _x Zn _{1-x}) ₂ P ₂ : a key material in Zn ₃ P ₂ -based photovoltaics <u>Ryoji Katsube</u> , Kenji Kazumi, Tomo Tadokoro, Yoshitaro Nose (<i>Kyoto Univ.</i>) |
| P-04 | Growth and electrical characterization of SnS single crystals <u>Tomoki Takemura</u> , Ryoji Katsube, Yoshitaro Nose (<i>Kyoto Univ.</i>) |
| P-05 | Donor-acceptor-type low bandgap polymer carrying phenylazomethine moiety as a metal-collecting pendant unit <u>Atsushi Kimoto</u> , Yusuke Tajima (<i>Konan Univ.</i>) |
| P-06 | Growth and characterization of CuSbS ₂ bulk crystals <u>Manato Takeuchi</u> , Akira Nagaoka, Shigeru Ikeda, Kenji Yoshino (<i>Univ. of Miyazaki, Konan Univ.</i>) |
| P-07 | Enhanced photocatalytic activity of monoclinic BiVO ₄ via Zr doping <u>K. Tajima</u> , I. Abdellaoui, M. Remeika, S. Ikeda, T. Kawaguchi, M. M. Islam, T. Maeda, T. Kusumoto, T. Wada, C. Budich, T. Sakurai (<i>Univ. of Tsukuba, Konan University, Ryukoku Univ., Tokyo Instruments</i>) |
| P-08 | Non-contact voltage calculation method of photovoltaic module using electrostatic electrometer <u>Sakutaro Miyajima</u> , Kensuke Nishioka (<i>Univ. of Miyazaki</i>) |
| P-09 | Effect of temperature for V _{OC} estimation from electroluminescence image <u>Kazuki Noguchi</u> , Takuya Oshima, Mohammad Aminul Islam, Yasuaki Ishikawa, Yukiharu Uraoka (<i>Nara Inst. of Sci. and Tech.</i>) |
| P-10 | Silver-incorporated Cu ₂ ZnSnS ₄ thin film utilized for solar cells and photoelectrochemical water splitting <u>Takato Kawaguchi</u> , Thi Hiep Nguyen, Takashi Harada, Shuji Nakanishi, Masanobu Higashi, Ryu Abe, Shigeru Ikeda (<i>Konan Univ., Osaka Univ., Kyoto Univ.</i>) |
| P-11 | Analyzing solar cell parameters by single diode model for high efficiency perovskite photovoltaics devices <u>Yu Kawano</u> , Atsushi Nakagawa, Tomohiro Nishikawa, Takahito Nishimura, Jakapan Chantana, Takashi Minemoto (<i>Ritsumeikan Univ.</i>) |

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| P-12 | Growth of P-doped ZnTe epilayers on ZnTe substrates by molecular beam epitaxy <u>K. Matsuo</u> , Y. Watanabe, T. Tanaka, K. Saito, Y. Nose, Q. Guo, K. M. Yu, W. Walukiewicz (<i>Saga Univ., Kyoto Univ., City Univ. of Hong Kong, Lawrence Berkeley National Lab.</i>) |
| P-13 | Interface structure and carrier transport behavior between Cu electrode and ZnSnP ₂ absorber <u>Taro Kuwano</u> , Shigeru Nakatsuka, Yoshitaro Nose (Kyoto Univ.) |
| P-14 | One-pot multiple postmodification of π -conjugated polymer by direct chemical modification Shunya Okayama, <u>Atsushi Kimoto</u> (Konan Univ.) |
| P-15 | CdTe and Cu ₂ ZnSnS ₄ single crystal photovoltaic device with high open-circuit voltage <u>Akira Nagaoka</u> , Darius Kuciauskasi, Michael A. Scarpulla, Kensuke Nishioka (Univ. Miyazaki, National Renewable Energy Lab., Univ. of Utah) |
| P-16 | Establishment of highly accurate PV temperature measurement method in real environmental conditions <u>Kazuki Okumoto</u> , Kensuke Nishioka (Univ. of Miyazaki) |
| P-17 | Nanoimprinted texture with Si-rich-SiN layer for crystalline Si solar cells <u>Seiya Yoshinaga</u> , Yasuaki Ishikawa, Yukiharu Uraoka (Nara Inst. of Sci. and Tech.) |
| P-18 | Impacts of Zr-doping into crystalline lattices of BiVO ₄ powder and thin film on their photocatalytic and photoelectrochemical activities <u>Takato Kawaguchi</u> , Takashi Harada, Yui Higuchi, Naoto Kawasaki, Mikas Remeika, Muhammad Monirul Islam, Takeaki Sakurai, Shigeru Ikeda (Konan Univ., Osaka Univ., Univ. of Tsukuba) |