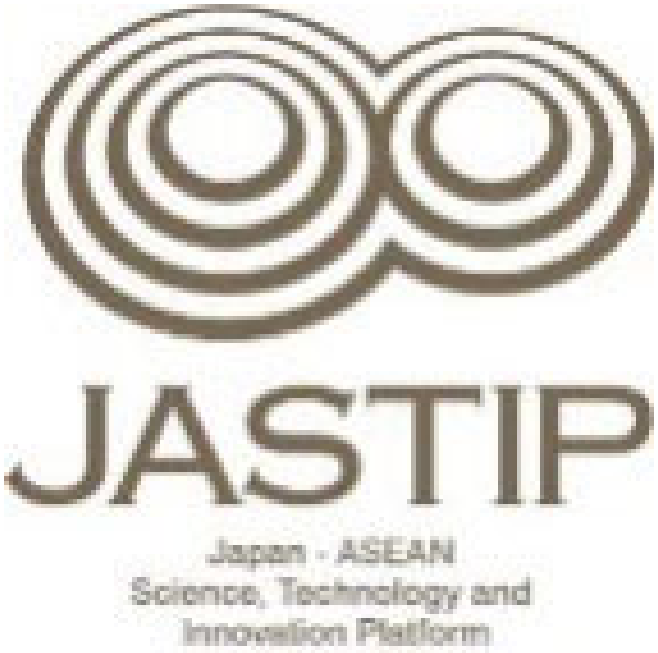
Feb. 1, 2019

JASTIP-WP2 activity report



JATIP Research lab

- Satellite lab.

INC1, Thailand Science Park, NSTDA

  - 2017- JASTIP Headquarter also uses
- MTEC, NANOTEC, BIOTEC + NECTEC (JASTIP-net)

- Collaboration Labs
  - King Mongkut's University of Technology, Thonburi (KMUTT), Bangkhuntien Campus (SATREPS related)
  - King Mongkut's Institute of Technology, Ladkrabang, Nano Center (Photocatalisys project)

  - Other countries are wishing to have the satellite lab.=> NEXT Phase?

Research activities

- Promoting Collaboration Research
  - NSTDA(NANOTEC) : Photocatalytic conversion of biomass to value-added fuels and chemicals
  - NSTDA(MTEC) : Development of Carbon Materials from Biomass for Energy Storage Applications
  - NSTDA(BIOTEC) : Innovations in Biomass Application for Catalytic Material Synthesis and Energy Devices
  - JGSEE/KMUTT : Extension of “Solvent Treatment Method” developed by SATREPS program to ASEAN region（Laos：2016-, Myanmar：2018-）
  - KMITL : Development of New Functional Materials for Energy and Environment
  - RE implementation (UY PV project: seeking $$)
  - JASTIP-net
    - NSTDA(NECTEC):Optimal design platform for smart integration of renewable energy in rural area

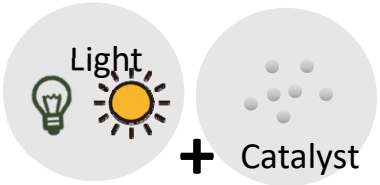




BIOTEC-JGSEE/KMUTT-Kyoto

Photocatalysis

Basic concept:



UV or visible light

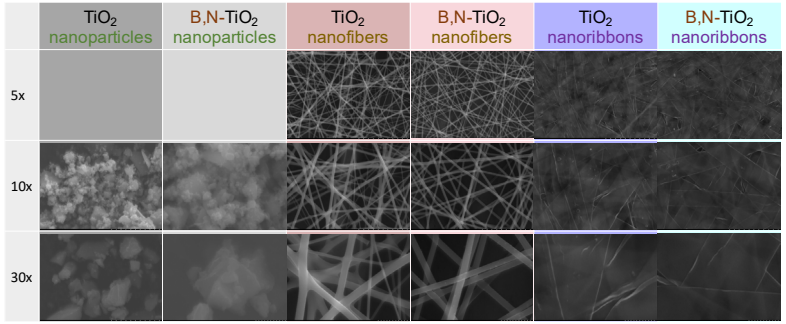
Sugars (Glucose, etc.)

Light → Photocatalysts

Value-added Chemicals

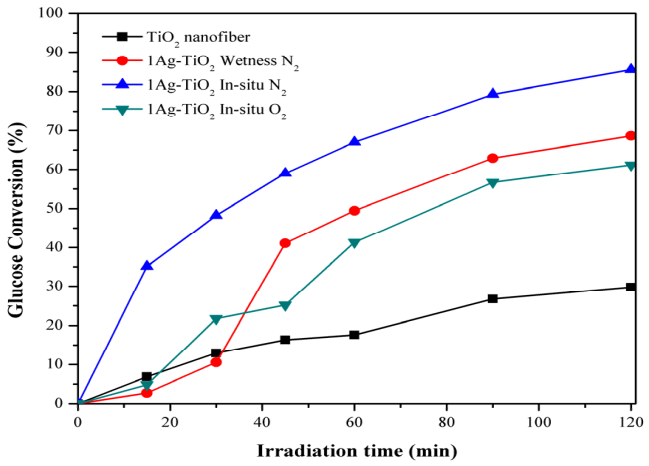
- Xylitol
- Gluconic acid
- Formic acid
- Arabinose

Photocatalysts



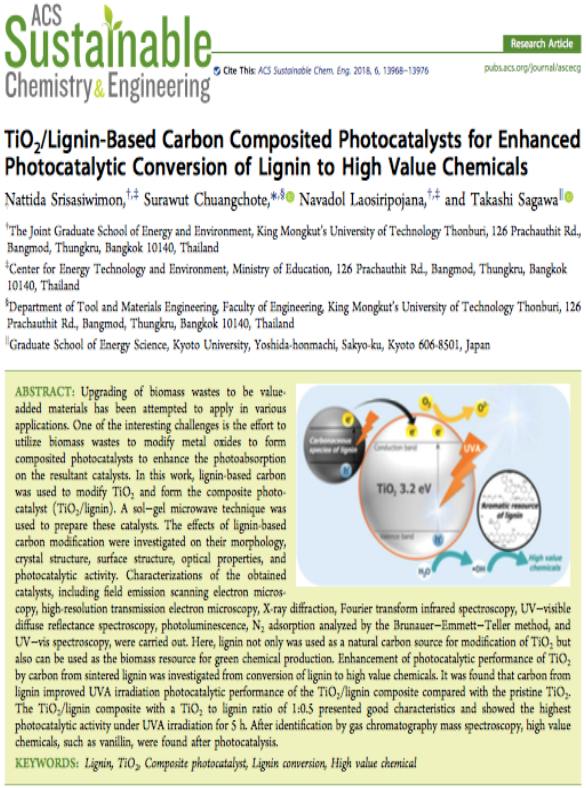
1.22um±0.30 1.50um±0.55 0.21um±0.10 0.14um±0.03 2.16um±0.21 1.70um±0.22

Sugar Conversions



Scientific Outputs

-Int. Journal : 2 papers + 2 submitted
-Int. Conf.: 2 invited + 3 orals



ACS Sustainable Chemistry & Engineering — Research Article

TiO_2/Lignin-Based Carbon Composited Photocatalysts for Enhanced Photocatalytic Conversion of Lignin to High Value Chemicals

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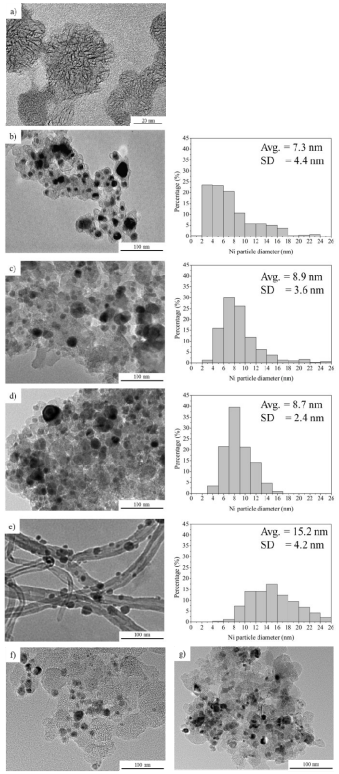
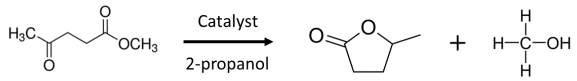
ABSTRACT: Upgrading of biomass wastes to be value-added materials has been attempted to apply in various applications. One of the interesting challenges is the effort to utilize biomass wastes to modify metal oxides to form composited photocatalysts to enhance the photoabsorption on the resultant catalysts. In this work, lignin-based carbon was used to modify TiO_2 and form the composite photocatalyst (TiO_2/lignin). A sol–gel microwave technique was used to prepare these catalysts. The effects of lignin-based carbon modification were investigated on their morphology, crystal structure, surface structure, optical properties, and photocatalytic activity. Characterizations of the obtained catalysts, including field emission scanning electron microscopy, high-resolution transmission electron microscopy, X-ray diffraction, Fourier transform infrared spectroscopy, UV–visible diffuse reflectance spectroscopy, photoluminescence, N_2 adsorption analyzed by the Brunauer–Emmett–Teller method, and UV–vis spectroscopy, were carried out. Here, lignin not only was used as a natural carbon source for modification of TiO_2 but also can be used as the biomass resource for green chemical production. Enhancement of photocatalytic performance of TiO_2 by carbon from sintered lignin was investigated from conversion of lignin to high value chemicals. It was found that carbon from lignin improved UVA irradiation photocatalytic performance of the TiO_2/lignin composite compared with the pristine TiO_2. The TiO_2/lignin composite with a TiO_2 to lignin ratio of 1:0.5 presented good characteristics and showed the highest photocatalytic activity under UVA irradiation for 5 h. After identification by gas chromatography mass spectroscopy, high value chemicals, such as vanillin, were found after photocatalysis.

KEYWORDS: *Lignin, TiO_2, Composite photocatalyst, Lignin conversion, High value chemical*

NANOTEC-CU/Kyoto

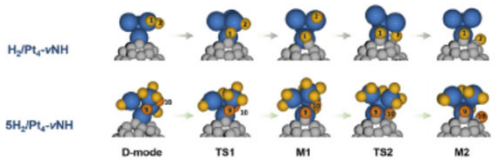
Carbon Nanohorns → **Catalytic materials for biomass conversion to γ-valerolactone**





App Surf Sci, 2018

H_2 storage materials



Int Hydrogen Energy, 2018

Electrocatalysts for H_2O_2 production

started in 2018, prelim data are positive

Scientific Output

- Int. Journal : 2 papers + 1 submitted
- Int. Conf.: 4 orals
- Two workshops
- 3 exchange researchers/students

- Kajornsak Faungnawakij
  "A CST Citation Award 2018 from *the Chemical Society of Thailand (CST) under the Patronage of Her Royal Highness Princess Chulabhorn Mahidol"*

7th INTERNATIONAL CONFERENCE ON SUSTAINABLE ENERGY AND ENVIRONMENT

"Technology & Innovation for Global Energy Revolution"

28-30 November 2018, Chatrium Hotel Riverside Bangkok, Thailand

JASTIP-WP2 "Symposium on STI for Sustainable Development Goals: How Can We Transfer the ASEAN-Japan Collaboration Research Outcomes in Bioenergy Field?" 30 November 2018

3 SATREPS and 2 e-Asia projects + UNEP, MTEC

Workshop, Seminar

- **Japan-Thailand Joint Seminar under JASTIP 2018**
- **Date: September 26, 2018**
  - Place: NANOTEC/NSTDA,
  - Prof. Sano, Prof. Kageyama

  + 4 graduate students visited Thailand (Sep. 23-28)
  - **Date: November 18-20, 2018**
  - Place: Kyoto University, Katsura Campus
  - Dr. Kajornsak + 3 researchers visited Kyoto

- **Supporting AUN/SEED-Net Regional Conference on Energy Engineering**
  - Date: Sep. 27-28
  - Place: The Manila Hotel, Philippine
  - UP Diliman

Invitation program

- 2018 Oct. 9 – Oct. 27: 3 Ph. D students, 3 Master students, and 2 Undergraduate students from KMUTT, KMITL , and CU(W&W program)
- 2018 Dec 7 – Dec. 27: 2 Undergraduate students from Thammasart University(W&W program)
- Invited 18 Researchers from NSTDA(5), UM(1), JGSEE(1), NUOL(1), LIPI(6, WP3), SERS(1,WP3), MJIIT(3,WP4): Total 348 person・day (Kyoto U budgets)

JASTIP-Net (2nd batch)

2017.10 - 2018.9

Research Theme:

- ☐ Studies on Rural/Community Renewable Energy.
- ☐ Development of Renewable Energy Technology adapted to the ASEAN region.
- ☐ Studies on Energy Policy/Security in the ASEAN region.

WP2: 21
Cambodia:1, Indonesia:5, Japan:1, Laos:3, Malaysia:3, Myanmar:7, Vietnam:1

JASTIP-Net (2nd batch)

Title	PI	collaborators
Study on Rural Electrification using Renewable Energy Impact on Lifestyle in Rural Community *Hitachi foundation*	Nasrudin Abd Rahim (UM), Malaysia	Swinburne University of Technology Sarawak, Malaysia Kyoto University, JP Universiti Putra Malaysia, Malaysia Institute of Technology of Cambodia, Cambodia Technological University, Hmawbi/ Yangon, Technological University, Myanmar Pyay University/ University of Yangon, Myanmar Kyocera Asia Pacific Co. Ltd, Thailand Earth Renewable Energy, Myanmar
Widening use of Solar Cell in Rural Areas in Indonesia: Interlinkage of Academician, Business, Government, and Community	Anugerah Yuka Asmara(LIPI), Indonesia*	Ritsumeikan U*, JP University of Brawijaya Surabaya State University *KAKENHI*
Establishing new biogas CRE model based on using water hyacinth at Giong Rieng district, Kien Giang province of Viet Nam	Tran Sy Nam (Can Tho University)*	Kyoto U *KAKENHI*

JASTIP-Net (2nd batch)

Title	PI	collaborators
Conceptual Design of Fixed Ocean Thermal Energy Conversion (OTEC) Offshore Power Plant *SATREPS*	Mohd Khairi Abu Husain(UTM), Malaysia	Saga U*
Application of Microbubble technology in biogas purification *AUN/SEED-Net*	Keonakhone KHOUNVILAY(NUOL), Laos	Tokai U*
Development of Green Microwave Carbocatalytic Technologies for Biomass Conversion Into Chemicals and Fuels Adaptable to the ASEAN Region *e-ASIA*	Armando QUITAIN(Kumamoto U)*, Japan	Universiti Teknologi PETRONAS (Malaysia) De La Salle University (Philippine*) Chulalongkorn University (Thailand) JGSEE/KMUTT (Thailand) Sepuluh Nopember Institute of Technology (Indonesia*) Mandalay Technological University (Myanmar)

JASTIP-Net (3rd batch)

Research Theme:
Implementation Study of Renewable Energy in South East Asia

14 proposals: IND(1), KHM(2), LAO(1), JP(2), ML(3), MY(3),VN(1),TL(1)

Selected MY, VN, TL
and Rural electrification programs

The mini-workshop on rural electrification research in JASTIP-net
2 February 2019 at Swissotel Bangkok Ratchada

Collaboration with SATREPS, e-Asia

- Cooperation with SATREPS, e-Asia
  - SATERPS “Development of Clean and Efficient Utilization of Low Rank Coal and Biomass by Solvent Treatment” (Prof. Miura/Prof. Bundit)

  => extension to the neighboring countries in JASTIP (Laos, Myanmar)
  - The e-ASIA JRP International Workshop 2016 (2016.10.31-11/1@Vientiane) and follow-up activity=> *Proposal has been adopted*
  - Closely discussing with e-Asia projects on Biomass and mini-grid system.

- Cooperation with industries
  - Many collaboration researches are running at NSTDA related labs.
  - Sub-satellite lab in KMITL has been opened to industry and the other research institute.
  - Hitachi Zosen

Any questions or comments?