

## The 32nd Saudi Arabia – Japan Symposium

The 32nd Saudi Arabia - Japan Symposium was jointly organized by Saudi Aramco, KFUPM, JCCP and the Japan Petroleum Institute (JPI) at KFUPM Dhahran Techno Valley, Saudi Arabia, on December 5 and 6, 2023.

In the opening of the symposium, opening remarks were addressed by KFUPM Vice President Dr Ali Ahmad Al-Shaikhi <sup>\*1</sup>, Saudi Aramco SVP Dr Ali A. Al-Meshari, JCCP Special Counsellor Mr. Masuda, and Dr. Atsushi Muramatsu, President of JPI and Professor of Tohoku University. In the opening remark, Dr. Atsushi Muramatsu gave a lecture in his Opening Remark. The symposium was attended by over 130 researchers, students and local Japanese companies.

The theme of this year's conference was "Advancement in Petroleum Refining Industries". 19 presentations (including five from Japan in which one online lecture) covering a wide range of fields from catalyst technology to carbon neutrality. Between presenters and audience, many active questions and answers were exchanged.

A poster session was also held, with 24 presentations by young researchers, including one from Japan, Along with the lectures, there was a lively Q&A session.

<sup>\*1</sup>. On behalf of Dr. Muhammad M. Al-Saggaf, President



## 32<sup>nd</sup> Annual Saudi-Japan Symposium – 2023



# Technology in Fuels & Petrochemicals

## Innovative Catalyst Development

Venue: KFUPM Dhahran Techno Valley, Innovation Cluster Bldg., Auditorium 1-111  
 December 5-6, 2023

## Day One: Tuesday, December 5, 2023

### OPENING REMARKS SESSION

Chairman: Dr. Wael Fouad, KFUPM

#### 8:30 Opening Remarks

- Dr. Muhammad M. Al-Saggaf, President, KFUPM
- Mr. Hitoshi Masuda, Special Counselor, JCCP
- Dr. Ali A. Al-Meshari, Senior Vice President, TOC, Saudi Aramco
- Dr. Atsushi Muramatsu, President, JPI

### SESSION ONE PETROLEUM CONVERSION

Chairman: Dr. Mohammad Al-Abdullah, Saudi Aramco

- 9:00 1. **Keynote: JPI direction along carbon neutrality and introduction of our research, direct methane conversion over zeolite catalysts;** Dr. Atsushi Muramatsu, President of JPI, Deputy Director (Soft Materials), Tohoku University, Japan
- 9:30 2. **Atmospheric impact of fugitive CH<sub>4</sub> and H<sub>2</sub>;** Dr. Theis Solling, Center for Integrated Petroleum Research, CIPR, KFUPM
- 9:50 3. **Crude to chemicals – old challenges and new opportunities;** Dr. Lujain R. Alfifil, Saudi Aramco R&DC

#### 10:10 Coffee break

### SESSION TWO AI AND ML APPLICATIONS

Chairman: Dr. Hassan Aljama, Saudi Aramco

- 10:40 4. **Application of ML to predict performance of oxidative dehydrogenation catalysts;** Dr. Gazali Tanimu, Center for Refining & Advanced Chemicals (CRAC), KFUPM
- 11:00 5. **Accelerating catalyst discovery using extrapolative ML approach;** Dr. Takashi Toyao, Institute for Catalysis, Hokkaido University, Japan
- 11:20 6. **AI and data-driven optimization of one-step crude to chemicals process;** Ms Noor Sulais, R&DC, Saudi Aramco

#### 11:40 Prayer & Lunch Break

### SESSION THREE PETROCHEMICALS-1

Chairman: Dr. Zuhair Malaibari, KFUPM

- 13:00 7. **Distillate hydrocracking catalyst and process to produce isomerase and steam feedstock;** Dr. Ashok K. Punetha, Saudi Aramco
- 13:20 8. **Molecular kinetic model development and parameter estimation for naphtha reforming;** Dr. Syed A. Ali, CRAC, KFUPM



**POSTER SESSION**

**Coordinator: Dr. Rajesh Theravalappil, KFUPM**

- 13:45 P1. **2-Pentene cracking over bifunctional MFI-type zeolites**; Mr. Mohammed Alkhunaizi, R&DC, Saudi Aramco
- 13:50 P2. **Post-Synthesis Functionalization of Covalent Organic Frameworks for Carbon Dioxide Capture from Air (DAC)**; Mrs. Mona Al-Otaibi, R&DC, Saudi Aramco
- 13:55 P3. **Resilience of transalkylation catalyst towards industrial contaminants**; Mr. Mosab T. Kheyami, R&DC, Saudi Aramco
- 14:00 P4. **Polypropylene cracking proceeding in micropores of MFI type zeolite**; Mr. Tomohiro Fukumasa, Center Research Green Sustainable Chemistry, Tottori University
- 14:05 P5. **Towards sustainable CO<sub>2</sub> valorization: Harnessing Cu single atoms and nanoparticles**; Ms. Esraa Kotob, CHEM, KFUPM
- 14:10 P6. **Catalytic conversion of LDPE plastic via pyrolysis process**; Mr. Feras Alqudayri, CRAC, KFUPM
- 14:15 P7. **Thermocatalytic pyrolysis of microalgae biomass over Y-zeolite catalyst towards clean fuel and valuable chemicals**; Ms. Hayat A. Haddad, CHE, KFUPM
- 14:20 P8. **Effect of plastic composition on the synergetic interactions, kinetic and thermodynamic properties from the co-pyrolysis of date palm waste and waste foam**; Dr. Ahmad Nawaz, CHE, KFUPM
- 14:25 P9. **Enhanced selectivity of benzene-toluene-ethyl benzene and xylene in direct conversion of n-butanol to aromatics over Zn-HZSM-5 catalysts**; Dr. Tatinaidu Kella, CRAC, KFUPM
- 14:30 P10. **Chemical modification and characterization of cellulose acetate**; Dr. Abdulrahman Musa, CRAC, KFUPM
- 14:35 P11. **Role of naphthenic-aromatic hydrocarbon in autoxidation of heavy vacuum gas oil for carbon fiber precursors**; Mr. Mustafa M. Amin, CHE, KFUPM
- 14:40 P12. **Methanol synthesis from CO<sub>2</sub> hydrogenation process: from catalyst design to technology Development**; Dr. Nagendra Kulal, CRAC, KFUPM
- 14:45 P13. **Well-designed glucose precursor carbon/g-C<sub>3</sub>N<sub>4</sub> nanocomposite for enhanced photocatalytic CO<sub>2</sub> conversion to fuels**; Dr. Abdullah Bafaqeer, CRAC, KFUPM
- 14:50 P14. **TiO<sub>2</sub> based photocatalyst for solar hydrogen production from water**; Dr. Muhammad Waqas, CRAC, KFUPM
- 14:55 P15. **Highly efficient Ni/SiO<sub>2</sub>-MgO catalyst for CO<sub>2</sub> methanation in synthetic natural gas production: Thermodynamics and catalytic insights**; Dr. Ijaz Hussain, CRAC, KFUPM
- 15:00 P16. **Enhancing the efficiency of Ti<sub>2</sub>C MXene electrocatalyst via zinc oxide nanorod intercalation for CO<sub>2</sub> electrochemical conversion to methane selectively**; Mr. Abdulalhi Abdulhakam, CHEM, KFUPM
- 15:05 P17. **Dual activity of zinc oxide-MXene nanocomposite for enhancing the electrochemical conversion of CO<sub>2</sub> to Value-added Product**; Mr. Abdulalhi Abdulhakam, CHEM, KFUPM
- 15:10 P18. **Highly efficient fibrous silica lanthanum oxide-supported nickel catalyst for dry reforming of methane**; Mr. Mohammed Awad, CHEM, KFUPM
- 15:15 P19. **Controlled synthesis of zinc layered double hydroxides for superior electrochemical CO<sub>2</sub> reduction**; Mr. Omer Taialla, CHEM, KFUPM
- 15:20 P20. **Spent FCC catalyst in pesticides microextraction a sustainable approach towards waste recycling/reuse**; Ms Shaima' Alsabbahen, CHEM, KFUPM
- 15:25 P21. **Turning waste in to value: K-promoted red mud as an effective catalyst for CO<sub>2</sub> hydrogenation to olefins**; Ms Mahbuba Aktary, MSE/IRC-HES, KFUPM
- 15:30 P22. **Production of dimethyl carbonate from CO<sub>2</sub> by using cerium oxide-based catalyst**; Mr. Mohammed Alqarni, CRAC, KFUPM
- 15:35 P23. **Molecular dynamics simulation of refrigerant separation using zeolite: A comprehensive study on adsorption**; Ms. Abrar A. Elhussein, CHE, KFUPM

**15:40 Poster Session Ends**

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# Technology in Fuels & Petrochemicals

## Innovative Catalyst Development

### Day Two: Wednesday, December 6, 2023

#### SESSION FOUR PETROCHEMICALS-2

**Chairman: Dr. Takashi Toyao, Hokkaido University**

- 8:30 9. Effect of gallium and platinum distribution encapsulated in silicalite-1 (MFI) zeolite on controlled propane dehydrogenation reaction; Mr. Fadhil A. Almukhtar, Saudi Aramco R&DC
- 8:50 10. Highly efficient dehydrogenation of isopentane to isoprene: Selectivity control of the catalytic reaction field by electric internal heating system; Dr. Ryo Watanabe, Shizuoka University, Japan
- 9:10 11. Insights on CO<sub>2</sub>-mediated oxidative dehydrogenation of propane: Aspen plus simulation and in situ DRIFT experiment; Dr. Yahya Gambo, CRAC, KFUPM
- 9:30 12. Light olefins cracking by zeolites prepared from refinery waste; Mr. Mohammad Rebh, Saudi Aramco R&DC

**9:50 Coffee Break**

#### SESSION FIVE SUSTAINABILITY-1

**Chairman: Dr. Saheed Ganiyu, KFUPM**

- 10:20 13. CO<sub>2</sub> hydrogenation to carbon-neutral liquid fuels by powerful catalyst; Dr. Noritatsu Tsubaki, University of Toyama, Japan (*Online Lecturer*)
- 10:40 14. CO<sub>2</sub> hydrogenation to lower olefins using iron supported catalysts; Dr. M. Nasiruzzaman Shaikh, Center for Hydrogen & Energy Storage, KFUPM
- 11:00 15. Insights into plastic pyrolysis and bio-oil upgrading: process optimization and techno-economic analysis; Dr. Omar Abdelaziz, CHE, KFUPM
- 11:20 16. Selective aromatics recovery by catalytic conversion of pyrolysis gas from carbon fiber reinforced plastic; Dr. Kazumasa Oshima, Kyushu University, Japan
- 11:40 17. Challenges and opportunities in converting waste plastic into value-added products; Dr. Mohammad Nahid Siddiqui, CHEM, KFUPM

**12:00 Prayer & Lunch Break**

#### SESSION SIX SUSTAINABILITY-2

**Chairman: Dr. Kazumasa Oshima, Kyushu University**

- 13:00 18. Challenge of green hydrogen production from air by direct air electrolysis; Dr. Etsushi Tsuji, Tottori University, Japan (*Online Lecturer*)
- 13:20 19. Adjusting the crude oil-to-chemical process using unconventional reactors and catalyst Formulations, Dr. Pedro Castano, KAUST Catalysis Center, KAUST
- 13:40 20. Fueling future aviation with CO<sub>2</sub> to jet technology; Mr. Arthur Foutsitzis, Honeywell UOP, KSA
- 14:00 21. 3D porous polymers for selective removal of CO<sub>2</sub> and H<sub>2</sub> storage; Dr. Othman Al Hamouz, Chemistry Department, KFUPM
- 14:20 22. Metal-organic frameworks functionalization and design strategies for CO<sub>2</sub> capture; Ms. Nawal M. Alghoraibi, R&DC, Saudi Aramco
- 14:40 Closing Remarks, Symposium Ends**  
 Dr. Wael Fouad, CRAC, KFUPM

Each presentation includes 5-minutes Q&A

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