Abdulrahman Alzailaie

SABIC Corporate R&D center, Thuwal-Jeddah 23955, Saudi Arabia

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Education:

King Abdullah University of Science & Technology (KAUST) – Saudi Arabia Sep 2021

- Master of Science in Chemical Engineering
- Master's thesis: "Hydrodynamics of a Gas-Solid Downer Reactor Using Particle Image Velocimetry (PIV) and Digital Image Analysis (DIA) techniques"
- Advisor: Prof. Pedro Castaño

King Fahd University of Petroleum & Minerals (KFUPM) –Saudi Arabia May 2016

- Bachelor of Science in Chemical Engineering
- Senior design project: "Process flowsheeting of the production of propylene glycol by the hydrogenolysis of glycerol"

Research Interest:

- Heterogeneous catalytic reaction engineering
- Process modeling and simulation
- Analyzing the economics of industrial processes

Research Experience:

Saudi Basic Industries Corporation (SABIC) 2016 – current
R&D Scientist

During my work at SABIC R&D center, I worked on the following projects in different capacities:

- **Mixed-plastic waste pyrolysis,** an on-going major project within SABIC, where we work towards developing a standardized method, to identify suitable catalysts and operating conditions.
    - Executed performance-structure correlation of commercial and in-house synthesized catalysts, using N2 adsorption isotherm and Thermal Gravimetric Analysis method
    - Performing a kinetic study utilizing suitable solvents and a fast-heating medium to minimize transport limitation due to plastic viscosity and oven temperature shoot up
    - Received initial training on Simulation Distillation and Detailed Hydrocarbon Analysis techniques to better understand the nature of liquid and gaseous products

- **Methane dry reforming,** a project aimed at utilizing CO2 to produce syngas that can be used, for example, in the methanol synthesis
    - Tested several catalysts using high-throughput and micro-reactors systems
    - Incorporated kinetics model into a conceptual process design with steam balance
    - Analyzed the gaseous products using mass spectrometry

- **Methane pyrolysis,** a project that utilizes the abundance of natural gas to produce green hydrogen
    - Ran several catalyst stability tests of methane pyrolysis—one with a 2100 hours long in cycle with CO_2+H_2O+O_2 (with varying proportions) as regeneration agents
    - Received one patent for utilizing the hollow-zeolite concept to reduce active site leaching upon regeneration (WO2018229729A1)
    - Developed a protocol (based on literature) to analyze the produced carbon allotropes, using Thermal Gravimetric Analysis in tandem with Raman Spectroscopy, and X-Ray Diffractions

Teaching and Tutoring Experience:

- **Teaching Assistant,** KAUST, with Prof. Javier Ruiz-Martinez, Spring 2019
    - Heterogeneous Catalysis course, full semester, 26 students
    - Developed and taught the practical assignment for the course (catalysis engineering part)
    - Aided the professor in the design of the exams and the evaluation of term projects

- **Online course publisher,** KAUST, with Prof. Mani Sarathy, 2020-2021
    - Proposed the idea to publish the Chemical Kinetics Modeling and Simulation course online
    - Streamlined the communication with a professional designer
    - Reviewed and published the material online

Publications:

- "Combined gasification and catalytic decomposition for the production of hydrogen and synthesis gas from hydrocarbons", WIPO patent (WO2018229729A1), *granted*
- "Hydrodynamics of a Gas-Solid Downer Reactor Using Particle Image Velocimetry (PIV) and Digital Image Analysis (DIA) techniques", SABIC R&D Journal club presentation, Dec 2021
- Hydrodynamics study of a counter-current downer reactor using particle image velocimetry technique and digital image analysis*, in-progress*

Awards and Activities:

- Granted Master's and PhD scholarships by SABIC, 2019 and 2022
- Awarded third place for the best undergraduate design project at KFUPM among 27 teams, by AIChE-Saudi chapter, 2016
- Co-presented KFUPM 43rd Graduation Ceremony & Honors Special Ceremony, 2014

Languages:

Arabic (native)
English (fluent)