

Malek Y. S. Ibrahim

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Education

- Post doctorate, Chemical Engineering, North Carolina State University
- PhD in Chemical Engineering, University of Illinois at Urbana-Champaign, GPA 3.92/4
- Master of Science in Chemical Engineering, University of Illinois at Urbana-Champaign, GPA 4/4
- Bachelor of Chemical Engineering, Cairo University, percentile 84.1%

Research highlights:

- Development of inflow C-N and C-C bond formation reactions (with Eastman Chemicals)
- Design of chloride adsorption beds in platforming catalyst regeneration towers (with Honeywell UOP)
- Perform process simulation using software packages (Aspen Plus, Unisim, and Hysys)
- Design of propane oxidative dehydrogenation riser reactor and catalyst (with Honeywell UOP)
- Design of flow chemistry platforms for optimized photocatalytic and gas-liquid reactions
- Synthesis and test transition metal supported nanoparticle catalysts for ethanol coupling
- Characterize the surface acid/base properties of heterogeneous catalysts
- Elucidate the effect of carbon monoxide on supported catalyst stability

Instrumentation: TEM, EDX, GC, MS, NMR, XRF, FTIR, ITC, XRD, XPS, XANES, in-flow characterization

Work Experience (Honeywell UOP)

Engineer/Scientist II, Modeling Group. 2018-2020

- UOP (A Honeywell Company), R&D, Des Plaines, IL, USA
- Generate PFD and perform techno-economic analysis on new CO₂ dry reforming process
- Lead the design of chloride adsorption process in platforming catalyst regeneration towers
- Optimize the light naphtha isomerization reactor conditions using Aspen Plus & Unisim
- Model the competitive adsorption kinetics of water and hydrogen chloride on naphtha reforming catalyst (DOE, pilot plant supervision, data processing, and equipment sizing tool development)
- Model the coke burn and water desorption from alumina catalysts in radial bed vessels
- Manage A&F fund to explore new zeolite synthesis for catalysis and adsorption application
- Develop conceptual process models and apply to reaction engineering and process optimization of new process technology using Unisim and Aspen Plus
- Provide kinetic modeling capability for technologies in early stages of Development
- Provide in-class and online Engineering Training Courses for Sales and Service Engineers

Technical Advisor Oct. 2010-Aug. 2013

Field Operations, Indonesia, Algeria, Russia, USA, and Saudi Arabia

- Build heat and mass balance using real time daily averaged data
- Perform root cause analysis for operation problems, and implement solutions
- Conduct equipment inspections, and performance surveys
- Build chemical process models on Unisim and Hysys for troubleshooting and optimization
- Participate in P&ID reviews and HAZOPs
- Conduct techno-economic analysis for new chemical process schemes using Unisim

Teacher Assistant 2015-2016 CHBE 431 (Process Design Course)

University of Illinois at Urbana-Champaign, IL, USA

- Lead class discussion sessions
- Assess ChemCad simulation reports
- Guide students in their senior project design
- Evaluate students design proposals

Patents & Publications

- Pd-Rh Cooperative Catalysis for the Production of Aryl Aldehydes and their Deuterated Analogues Using the Water-Gas Shift Reaction. *Angew. Chem. Int. Ed.* **2018**, *57*, 10362.
- Room Temperature, Reductive Alkylation of Activated Methylene Compounds: Carbon–Carbon Bond Formation Driven by the Rhodium- Catalyzed Water–Gas Shift Reaction. *ACS Catal.* **2017**, *7* (1), 613-630.
- Spectroscopic evidence for origins of size and support effects on selectivity of Cu nanoparticle dehydrogenation catalysts. *Chem. Commun.* **2017**, *53* (3), 597-600.
- Aldol condensation among acetaldehyde and ethanol reactants on TiO₂: Experimental evidence for the kinetically relevant nucleophilic attack of enolates. *J. Catal.* **2018**, *361*, 290-302.
- Selective Extraction of Supported Rh Nanoparticles under Mild, non-acidic Conditions with Carbon Monoxide. *J. Mater. Chem. A.* **2018**, advance article
- Self-driving laboratories for autonomous materials and molecule discovery. *Chem.* **2021**
- Microfluidics: Towards a Sustainable Voyage through the Chemical Universe. *Annu. Rev. Chem. Biomol. Eng.* **2021**, in-review
- On-Demand Regioselectivity Tuning of Aldehyde Branching with a Cyclic Fluorophosphite Ligand. *Angew. Chem. Int. Ed.* **2021**, Submitted
- Intensified Continuous Extraction and Recovery of Switchable Hydrophilicity Solvents, *Chem. Commun.* **2021**, Advance Article
- Rapid and Recyclable Cooperative Catalyst for Continuous Hydroaminomethylation with Sterically Hindered Amines in Segmented Flow Reactor, *Sci Adv*, **2021**, Submitted
- Water-Driven Quinoline Hydrogenation and Photocatalytic Dehydrogenation for Inflow Hydrogen Storage Reactions, **2021**, in preparation
- Fluidized Catalyst Circulation Reactor for Paraffin Oxyd. Dehydrogenation, U.S. patent 13/920,543
- Device for cleaning a moving handrail belt, U.S. patent 2017/0217735 A1
- Extraction of Selected Platinum-Group Metals from Supported Catalyst, U.S. patent 20190161824A1
- Intensified Hydroaminomethylation in Flow, NCSU Patent Application, U.S. patent 63/256,132
- On-Demand Regioselectivity Tuning of Aldehyde Branching with a Cyclic Fluorophosphite Ligand, Eastman Chemicals Patent Application, U.S. patent 63/219,213

Fellowships and Funding Awards

- Honeywell Applied & Fundamental Research Fund, \$ 32 K research fund, 2020
- Hanratty Conference Travel Award, 2017
- 3M Graduate Student Fellowship, 2015
- Best poster Award, Catalysis Club of Chicago Symposium, 2015
- Dow Chemical Graduate Student Fellowship, 2014
- UOP Innovation Challenge Award, 2011
- Schneider Electric Egypt Design competition award, 2009
- The Honor Society of Phi Kappa Phi Membership

Conferences

- AIChE Midwest Regional Conference, Chair of Catalysis Session, USA, 2020
- SUNCAT Summer Institute, USA, 2021
- Catalysis Club of Chicago Spring Symposium, Oral presentation, USA, 2017
- Catalysis Club of Chicago Spring Symposium, Poster, USA, 2014 & 2015
- Honeywell Symposium, Argonne National Lab, USA, 2011
- Middle East Hydrocarbon Processing Technologies –METECH- UAE, 2011
- Crude oil exploration workshop held by ExxonMobil, Turkey, 2010