HOOTAN ROSHANDEL

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Education

Ph.D., Chemistry ***2025 (expected)***

University of California, Los Angeles, CA
Advisor: Prof. Paula Diaconescu, Co-advisor: Prof. Anastasia Alexandrova

Bachelor of Science, Chemistry ***May 2020***

University of British Columbia, Vancouver, BC, Canada
Advisor: Prof. Parisa Mehrkhodavandi
*Thesis: "*Exploring the Transition Metal-Like Properties of Indium*"*

Research Experience

University of California, Los Angeles (Advisor: Prof. Paula Diaconescu) ***Sept 2020 – present***

- Study of redox switchable nickel and palladium catalysts for coupling and polymerization of biocompatible materials
    - Exploring of redox switchable nickel and palladium complexes for the coupling of CO_2 and olefins, such as ethylene and butadiene, and the subsequent polymerization of the coupled product through DFT and experimental methods

University of British Columbia (Advisor: Prof. Parisa Mehrkhodavandi) ***Jan 2019 - May 2020***

- Study of hemilabile cationic alkyl indium complexes for polymerization of cyclic esters and ethers
    - Synthesis of half-salen derivative hemilabile neutral and cationic indium complexes
    - Characterization of indium complexes and polymers through various 1D and 2D NMR techniques (HSQC, HMBC, COSY, NOESY, DOSY, $^{1}H\{^{1}H\}$, $^{31}P\{^{1}H\}$, $^{13}C\{^{1}H\}$, VT-NMR), MALDI-TOF, and SEC
- Mechanistic elucidation of indium-catalyzed direct CO_2/epoxide cycloaddition
    - Developed and tested new DFT parameters in ORCA computational package to determine the reaction mechanism of a complex multi-step reaction
    - Assessed the Lewis acidity of indium complexes through a modified Gutmann-Beckett method involving basic glassblowing techniques

- Exploring the transition metal-like behavior of indium using a highly tunable NCN pincer ligands
    - Designed and synthesized an easily modifiable sterically hindered NCN pincer ligand to tune the electronic properties of indium in the +1 and +3 oxidation state
    - Study of the electronics of NCN In(I) and In(III) complexes through DFT and TDDFT

University of British Columbia (*Advisor: Prof. Pierre Kennepohl*) ***May 2017 - Dec 2018***

- Exploration of the structural and electronic properties of isoelectronic nickel and copper π-complexes through spectroscopy and computational chemistry
    - Characterization of complexes through UV-Vis, XAS, EPR, and VT NMR spectroscopy
    - Analysis of the electronics of the complexes through DFT and TDDFT using ORCA and Gaussian
    - Modification of simple glassware (i.e, pipettes and NMR tubes) using flame to create favorable conditions for crystallization processes such as liquid or vapor diffusion

- Collaboration project with Dr. Rajalakshmi Subramaniyam: characterization of nanoparticles used towards treatment of breast cancer
    - Analysis of organocopper nanoparticles via XPS to determine the presence of copper species in different oxidation states

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Work Experience

Aether Catalyst Solutions Inc. ***Jan - April 2018***

- Synthesis and characterization of three-way solid-state base metal emission catalysts
  - Preparation of catalyst through incipient wetness impregnation of modified ceramic plugs and sol-gel synthesis
  - Characterization of catalysts using SEM and XPS
  - Setup of custom reaction apparatuses for high temperature conditions (up to 500°C) for catalyst plugs and powders using mixed gasses such as H_2, NO_x, N_2, and hydrocarbons controlled using mass flow controllers

Teaching Experience

University of California, Los Angeles ***Oct 2020 - Sept 2021***

- Teaching assistant for first year chemistry discussions
  - Taught introductory chemistry and senior level organometallic chemistry to class sizes of 30 in-person and through Zoom
  - Encouraged student activity and participation through third party services such as Google Docs, custom made 3D and Augmented reality models during the sessions

University of British Columbia (Undergraduate Lab TA) ***Sept - Dec 2018, 2019***

- Undergraduate teaching assistant for first year chemistry labs (CHEM 121)
  - Demonstrated and taught proper lab techniques to two groups (12 students each) with little background in chemistry
  - Provided a safe and engaging environment for students to freely ask questions and be curious

Publications

(1) Goonesinghe, C.; Jung, H-J.; **Roshandel, H.**; Diaz, C.; Baalbaki, H.; Nyamayaro, K.; Ezhova, M.; Hosseini, K.; Mehrkhodavandi, P. "An Air Stable Cationic Indium Catalyst for Formation of High Molecular Weight Cyclic Poly(Lactic Acid)" *ACS catal.* **Submited**

(2) Baalbaki, H.; **Roshandel, H.**; Hein, J.; Mehrkhodavandi, P.; "Conversion of dilute CO_2 to cyclic carbonates at sub-atmospheric pressures by a simple indium catalyst" *Catal. Sci. Technol.* **2021**, DOI: 10.1039/D0CY02028A

(3) Goonesinghe, C.; **Roshandel, H.**; Diaz, C.; Jung, H-J.; Nyamayaro, K.; Ezhova, M.; Mehrkhodavandi, P. "Cationic Alkyl Indium Complexes: Tuning the reactivity with hemilability" *Chem. Sci.* **2020.**

(4) Desingh, R-P.; Manickaraj, S.; Natarajan, S; **Roshandel, H.**; Ravishankar, K.; Kennepohl, P.; Chatterjee, S.; Subramaniyam, R. "Green Synthesis of Copper Oxide Nanoparticles Using Sinapic Acid: An Underpinning Step towards Antiangiogenic Therapy for Breast Cancer" *J. Biol. Inorg. Chem.* **2019**, 1–13.

Community Involvement / Outreach

Web and App Developer ***Oct 2020 – present***

- Currently creating an augmented/ virtual reality application for the visualization of 3D chemical models after detecting a target image in Unity game engine using: Blender, JavaScript, CSS, HTML, and C#. The program can be used in a browser or mobile phone, with the purpose of education and visual aid for user with various scientific backgrounds.

Undergraduate Mentorship Program ***Jan – April 2019***

- Guided and advised new UBC chemistry undergraduate students as a mentor.

Genome BC, Science World ***Sept 2016***

- Demonstrated fun and interactive science experiments (e.g., extraction of DNA from kiwi and strawberries) to small groups of children and young teens.

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Awards and Professional Affiliations

Award for Undergraduate Research in Inorganic Chemistry, Chemical Institute of Canada	**Feb 2021**
Best Undergraduate Poster Award, BC Inorganic Discussion Weekend	**May 2019**
Member of Canadian Institute of Chemistry	**Since 2019 - present**
Member of Association of the Chemical Profession of British Columbia	**Since 2019 - present**
Member of Undergraduate Chemical Society, UBC	**Since 2016 - present**