

**EDUCATION**

**Ph.D. in Chemical Engineering**, 2020 - present, University of Colorado Boulder

**B.S. in Chemistry**, *Magna Cum Laude*, 2017, Trinity University

**EMPLOYMENT HISTORY**

08/19-05/20: Lab Manager, Department of Chemistry, Trinity University

- Promoted to manage additional responsibilities during adviser's sabbatical.
- Managed research activities of 6 undergraduate students and lab inventory, in addition to ongoing personal projects.

05/17-08/19: Research Technician, Department of Chemistry, Trinity University

- Designed and conducted synthetic, spectroscopic and kinetic experiments.
- Drafted manuscripts for publication and participated in response to peer-review, and presented poster and talks at national conferences.
- Developed a new project from inception to data collection, which included literature review, acquiring and engineering reactor components and control testing.

**HONORS & AWARDS**

Dean's Graduate Assistantship, University of Colorado Boulder, 2020

Kokes Award Recipient, North American Catalysis Society, 2017

Phi Beta Kappa, 2017

William Crews McGavock Scholar Award for Top Chemistry Student, Trinity University, 2017

McGavock Symposium Most Outstanding Poster Award, Trinity University, 2017

Academic All-American, CoSIDA, 2016

ACS Division of Inorganic Chemistry Undergraduate Research Award Runner-Up, American Chemical Society, 2016

John A. Burke Inorganic Chemistry Award, Trinity University, 2016

**MEMBERSHIPS & AFFILIATIONS**

American Association for the Advancement of Science, 08/18-Present

Organic Reactions Catalysis Society, 03/18-Present

North American Catalysis Society, 06/17-Present

Phi Beta Kappa, Epsilon Chapter, 05/17-Present

American Chemical Society, 03/17-Present

Southwest Catalysis Society, 04/17-05/20

**PUBLICATIONS**

Mahdavi-Shakib, A., Sravan Kumar, K. B., **Whittaker, T. N.**, Xie, T., Rioux, R. M., Grabow, L. C., Chandler, B. D. "Kinetics of H<sub>2</sub> Adsorption at the Metal-Support Interface of Au/TiO<sub>2</sub> probed by Broad Background IR Absorbance", *Angew. Chem. Int. Ed.* **2021**. DOI: 10.1002/anie.202013359

- Synthesized supported Au catalysts and assisted with the interpretation of TEM data
- Performed volumetric H<sub>2</sub> adsorption experiments and assisted with FTIR data collection
- Wrote sections of the manuscript.

Mahdavi-Shakib, A.; Sempel, J.; Babb, L.; Oza, A.; Hoffmann, M.; **Whittaker, T. N.**; Chandler, B. D.; Austin, R. N. “Combining Benzyl Alcohol Oxidation Saturation Kinetics and Hammett Studies as Mechanistic Tools for Examining Supported Metal Catalysts”, *ACS Catal.*, **2020**, 10, 10207-10215

- Synthesized Au catalysts and helped write the manuscript.

Sravan Kumar, K. B.; **Whittaker, T. N.**; Peterson, C.; Grabow, L. C.; Chandler, B. D. “Water Poisons H<sub>2</sub> Activation at the Au-TiO<sub>2</sub> Interface by Suppressing Electron Transfer between Au and Titania”, *J. Am. Chem. Soc.*, **2020**, 142 (12), 5760-5772.

- Performed, analyzed and interpreted H<sub>2</sub> oxidation kinetics and Arrhenius studies.
- Assisted with data analysis from FTIR spectroscopy experiments and DFT modeling.
- Wrote large sections of the manuscript.

Bruno, J. E.; Dwarica, N. S.; **Whittaker, T. N.**; Hand, E. R.; Guzman IV, C. S.; Dasgupta, A.; Chen, Z.; Rioux, R. M.; Chandler, B. D. “Supported Ni-Au Colloid Precursors for Active, Selective and Stable Alkyne Partial Hydrogenation Catalysts”, *ACS Catal.*, **2020**, 10, 2565-2580.

- Assisted with Au, Ni and NiAu catalyst synthesis
- Performed volumetric H<sub>2</sub> heat of adsorption experiments.

**Whittaker, T.**; Sravan Kumar, K. B.; Peterson, C.; Pollock, M. N.; Grabow, L. C.; Chandler, B. D. “H<sub>2</sub> Oxidation over Supported Au Nanoparticle Catalysts: Evidence for Heterolytic H<sub>2</sub> Activation at the Metal-Support Interface”, *J. Am. Chem. Soc.*, **2018**, 140 (48), 16469-16487.

- Measured H<sub>2</sub> oxidation kinetics over Au/TiO<sub>2</sub> and Au/Al<sub>2</sub>O<sub>3</sub>.
- Collected and interpreted *in-situ* FTIR spectra during H<sub>2</sub> adsorption on Au/TiO<sub>2</sub>.
- Assisted with data analysis from DFT modeling.
- Wrote the manuscript.

Saavedra, J.; **Whittaker, T.**; Chen, Z.; Pursell, C. J.; Rioux, R. M.; Chandler, B. D. “Controlling Activity and Selectivity using Water in the Au-catalysed Preferential Oxidation of CO in H<sub>2</sub>”, *Nature Chemistry*, **2016**, 8, 584-589.

- Collected and interpreted *in-situ* FTIR spectra during CO adsorption on Au/Al<sub>2</sub>O<sub>3</sub> and Au/TiO<sub>2</sub>.

### **PUBLICATIONS (In preparation)**

**Whittaker, T. N.**, Sravan Kumar, K. B., Mahdavi-Shakib, A., Xie, T., Rioux, R. M., Grabow, L. C., Chandler, B. D. “Semiconductor Properties of Oxide-Supported Au Catalysts Dictate the Thermodynamics of H<sub>2</sub> Adsorption at the Metal-Support Interface”, *In Preparation*.

- Synthesized a series of Au/TiO<sub>2</sub> catalysts with different particle size (same loading) and different loading (same particle size) and interpreted TEM and XRD data
- Designed and performed volumetric H<sub>2</sub> adsorption measurements
- Interpreted data and wrote large sections of the manuscript

**Whittaker, T. N.**; Mahdavi-Shakib, A.; Sravan Kumar, K. B.; Bradley, A.; Grabow, L. C.; Chandler, B. D. “Kinetic Isotope Effect Confirms Proton-Coupled Electron Transfer-like H<sub>2</sub> Activation for Oxide Supported Au Catalysts”, *In Preparation*.

- Synthesized Au/TiO<sub>2</sub> and Au/Al<sub>2</sub>O<sub>3</sub> catalysts and performed *in-situ* FTIR spectroscopy
- Performed H<sub>2</sub> oxidation kinetics experiments, kinetic isotope effect experiments.

- Managed the undergraduate student (A. Bradley) who performed reaction kinetics studies. Singha, R. K., Sravan Kumar, K. B.; Bruno, J. E.; **Whittaker, T. N.**; Xie, T.; Rioux, R. M.; Grabow, L. C.; Chandler, B. D. “Re-evaluating the Alkyne Hydrogenation Mechanism over Oxide-Supported Au in the Context of Heterolytic H<sub>2</sub> Activation”, *In Preparation*.
- Synthesized differently sized Au nanoparticles supported on TiO<sub>2</sub> and performed H<sub>2</sub> oxidation kinetics experiments.

### **CONFERENCE PRESENTATIONS**

**North American Catalysis Society NAM 26 (Oral Presentation)**, Chicago, IL, 2019. “H<sub>2</sub> and O<sub>2</sub> Activation over Au Catalysts: Heterolytic H<sub>2</sub> Activation at the Metal-Support Interface and the Role of Support Protons”.

**North American Catalysis Society NAM 26 (Poster)**, Chicago, IL, 2019. “Physisorbed H<sub>2</sub>O on Metal-Oxide Supported Au Nanoparticle Catalysts: Origin of the Poisoning Effect in H<sub>2</sub> Oxidation”.

**Southwest Catalysis Society Spring 2019 Meeting (Poster)**, Houston, TX, 2019. “Physisorbed H<sub>2</sub>O on Metal-Oxide Supported Au Nanoparticle Catalysts: Origin of the Poisoning Effect in H<sub>2</sub> Oxidation”.

**Southwest Catalysis Society Spring 2018 Meeting (Poster)**, Houston, TX, 2018. “Understanding the Role of H<sub>2</sub>O in H<sub>2</sub> Activation on Metal Oxide Supported Au”.

**Organic Reactions Catalysis Society 27th Biennial Meeting (Poster)**, San Diego, CA, 2018. “Understanding the Role of H<sub>2</sub>O in H<sub>2</sub> Activation on Metal-Oxide Supported Au”.

**North American Catalysis Society NAM 25 (Poster)**, Denver, CO, 2017. “Understanding the Role of H<sub>2</sub>O in the Preferential Oxidation of CO in H<sub>2</sub>: H<sub>2</sub> Oxidation Kinetics and H<sub>2</sub> and CO adsorption”.

**Southwest Catalysis Society Spring 2017 Meeting (Poster)**, Houston, TX, 2017. “Understanding the Role of H<sub>2</sub>O in the Preferential Oxidation of CO in H<sub>2</sub> using Kinetic Studies of H<sub>2</sub> Oxidation”.

### **TEACHING EXPERIENCE**

Spring 2021, Senior Chemical Engineering Laboratory, 2 sections

### **SERVICE**

Volunteer Assistant Coach, Central Catholic High School Boys' Soccer, October 2013-Present

- Volunteered as a goalkeeper coach.
- Team Accomplishments: 4 State Championships and 2 All-State Goalkeeper selections.
- Provided college admissions advice to players.

Volunteer Assistant Coach, Trinity University Men's Soccer, Fall 2017

- Volunteered for one season as a goalkeeper coach.
- Team Accomplishments: SCAC Regular Season Champions, SCAC Tournament Champions, SCAC Defensive Player of the Tournament and NCAA DIII National Tournament, Round of 32.