

Daniel T. Bregante

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Education

University of Illinois at Urbana-Champaign; Urbana, IL

Ph.D. in Chemical and Biomolecular Engineering May 2020 (expected)

Ph.D. Advisor: David W. Flaherty, Ph.D. GPA: 4.0

National Defense Science and Engineering Graduate (NDSEG) Fellow

University of California, Berkeley; Berkeley, CA

B.S. in Chemical and Biomolecular Engineering *with honors* May 2015

Concentration in Applied Physical Sciences; Minor in Chemistry GPA: 3.7

Undergraduate Advisor: Clayton J. Radke, Ph.D.

Professional Experience (Current)

Graduate Student Researcher Sept. 2015 – Present

University of Illinois at Urbana-Champaign; Urbana, IL

Advisor: Professor *David W. Flaherty*, Department of Chemical Engineering

- Working on various chemistries, including: (1) Influence of reactant structure and catalyst physicochemical properties on H₂O₂ activation for green oxidations, (2) Spectroscopic studies on the active form of oxygen for C-H activation in Methane, (3) Small oxygenate (e.g., Ethanol) coupling over group IV and V substituted zeolites, and (4) the direct synthesis of H₂O₂ from H₂ and O₂ over bimetallic catalysts
- Designed and built *in situ* UV-vis, ATR-IR, and Raman flow cells for the determination of the active intermediate for gas- and liquid-phase catalytic reactions
- Safety Officer and Webmaster

Awards & Honors

- National Defense Science and Engineering Graduate (NDSEG) Fellowship 2016 – 2019
- Frederic and Edith Mavis Future Faculty Fellow 2017 – 2018
- Richard J. Kokes Award 2017
- Thomas J. Hanratty Travel Award 2017
- National Science Foundation Graduate Research Fellowship; Honorable Mention 2016
- Samuel W. Parr Graduate Fellowship 2015 – 2016
- UC Berkeley, College of Chemistry Summer Research Stipend 2014
- Melvin J. Heger-Horst Undergraduate Fellowship 2013 – 2014
- UC Berkeley Scholarship 2013 – 2014
- Frank Delfino Chemical Engineering Summer Research Stipend 2013

Publications

[‡]Denotes equal contribution (i.e., co-first authorship); [§]Denotes undergraduate mentee

1. **Bregante, D.T.**; Flaherty, D.W.; “[Periodic Trends in Olefin Epoxidation over Group IV and V Framework-Substituted Zeolite Catalysts: A Kinetic and Spectroscopic Study](#)” *J. Am. Chem. Soc.*, **2017**, *139*, 6888-6898.
**Highlighted in [Illinois News Bureau](#), [Science Daily](#), [Science Newsline](#), [Phys.org](#), etc.*
2. **Bregante, D.T.**; Priyadarshini, P.; Flaherty, D.W.; “[Kinetic and Spectroscopic Evidence for Reaction Pathways and Intermediates for Olefin Epoxidation on Nb in *BEA](#)” *J. Catal.*, **2017**, *348*, 75-89.
3. Moteki, T.; Rowley, A.T.; **Bregante, D.T.**; Flaherty, D.W.; “[Formation Pathways toward 2- and 4-Methylbenzaldehyde via Sequential Reactions from Acetaldehyde over Hydroxyapatite Catalysts](#)” *ChemCatChem*, **2017**, *9*, 1921-1929.
4. Dursch, T.J.; Liu, D.E.; Taylor, N.O.; Chan, S.Y.; **Bregante, D.T.**; Radke, C.J.; “[Diffusion of Water-Soluble Sorptive Drugs in HEMA/MAA Hydrogels](#)” *J. Control. Release*, **2016**, *239*, 242-248.
5. Dursch, T.J.; Liu, D.E.; Oh, Y.; **Bregante, D.T.**; Chan, S.Y.; Radke, C.J.; “[Equilibrium water and solute uptake in silicone hydrogels](#)” *Acta Biomater.*, **2015**, *18*, 112-117.

Book Chapters

6. Wilson, N.M.;[‡] **Bregante, D.T.**;[‡] Priyadarshini, P.; Flaherty, D.W.; “[Production and use of H₂O₂ for atom-efficient functionalization of hydrocarbons and small molecules](#)” *Catalysis*, **2017**, *29*, 122-212.

Publications in Progress

1. **Bregante, D.T.**; Thornburg, N.E.; Notestein, J.M.; Flaherty, D.W.; “Consequences of Confinement on Highly Dispersed Group IV and V Metal Oxide Catalysts for Olefin Epoxidation with Hydrogen Peroxide” *ACS Catal.*, *In review*
2. Dion, M.Z.; Wang, Y.J.; **Bregante, D.T.**; Chan, W.; Andersen, N.; Hilderbrand, A.; Leiske, D.; Salisbury, C.M.; “The use of a 2,2’azobis (2-amidinopropane) dihydrochloride (AAPH) stress model as an indicator of oxidation susceptibility for monoclonal antibodies” *J. Pharm. Sci.*, *In review*
3. Zhang, H.;[‡] **Bregante, D.T.**;[‡] Flaherty, D.W.; “Trends in Reactivity among Group IV and V Framework Substituted Zeolites for C-C Bond Formation, MPV, Dehydration, and Esterification Reactions” *J. Am. Chem. Soc.*, *In preparation*
4. **Bregante, D.T.**; Patel, A.Y.;[§] Johnson, A.M.;[§] Nagode, K.E.;[§] Flaherty, D.W.; “Periodic Trends in the Oxidative Desulfurization of Thiophenes by Group IV and V Framework-Substituted Zeolites with Hydrogen Peroxide” *Green Chem.*, *In preparation*
5. **Bregante, D.T.**; Johnson, A.M.;[§] Patel, A.Y.;[§] Flaherty, D.W.; “Influence of Catalyst Physicochemical Properties for Olefin Epoxidation with Hydrogen Peroxide over Group IV and V Metal Oxide Catalysts and Zeolites” *J. Am. Chem. Soc.*, *In progress*

6. Wilson, N.M., Schröder, J., **Bregante, D.T.**, Yang, Q., Zuo, J.M., Kunz, S., and Flaherty, D.W. "PdZn Clusters - A Highly Selective Catalyst for the Direct Synthesis of H₂O₂," *J. Am. Chem. Soc., In preparation*

Presentations (Oral; Presenting Author Underlined)

1. "Group IV and V Periodic Trends in Olefin Epoxidation: Effects of Local Environment and Electronic Structure" **Bregante, D.T.**; Thornburg, N.E.; Notestein, J.M.; Flaherty, D.W.; 2017 AIChE National Meeting; November 1st, 2017; Minneapolis, MN
2. "Kinetic and Spectroscopic Evidence for Periodic Trends in Olefin Epoxidation over Group IV and V *BEA" **Bregante, D.T.**; Flaherty, D.W.; 25th Annual North American Meeting of the Catalysis Society (NAM 25); June 6th, 2017; Denver, CO
3. "Periodic Trends in Olefin Epoxidation over Group IV and V Zeolite Catalysts" **Bregante, D.T.**; Flaherty, D.W.; 253rd ACS National Meeting; Apr. 6th, 2017; San Francisco, CA
4. "H₂O₂ Activation over Group IV and V Substituted Zeolites for Olefin Epoxidation" **Bregante, D.T.**; Flaherty, D.W.; Chemical and Biomolecular Engineering Graduate Symposium; Oct. 28th, 2016; Urbana, IL – *1st place award for oral presentations*

Presentations (Posters; Presenting Author Underlined)

1. "Group IV and V Periodic Trends in Olefin Epoxidation: Effects of Electronic Structure and Local Environment" **Bregante, D.T.**; Thornburg, N.E.; Notestein, J.M.; Flaherty, D.W.; 2017 AIChE National Meeting; November 1st, 2017; Minneapolis, MN
2. "Periodic Trends in Olefin Epoxidation over Group IV and V Zeolite Catalysts" **Bregante, D.T.**; Flaherty, D.W.; Catalysis Club of Chicago Symposium; May 16th, 2017; Naperville, IL
3. "Reaction Pathways and Intermediates for Epoxidation on Nb-*BEA" **Bregante, D.T.**; Flaherty, D.W.; Catalysis Club of Chicago Symposium; May 17th, 2016; Naperville, IL
4. "Automation of a high-throughput assay to quantify peptide modification in mAbs by UHPLC-HRMS" **Bregante, D.T.**; Chan, W.; Xu, A.; Genentech Internship Poster Presentation; Aug. 15th, 2015; South San Francisco, CA
5. "Sliding Friction Coefficient of Soft Surface-Gel Coatings for Soft Contact Lenses" **Bregante, D.T.**; Dursch, T.J.; Peng, C.C.; Radke, C.J.; Saegebarth Undergraduate Research Fair; Apr. 24, 2015; Berkeley, CA
6. "Surface Gel Coatings for Soft Contact Lenses" **Bregante, D.T.**; Dursch, T.J.; Peng, C.C.; Radke, C.J.; Saegebarth Undergraduate Research Fair; Apr. 25, 2014; Berkeley, CA

Presentations (Contributing Author; Presenting Author Underlined)

1. "Functional Descriptors, Active Intermediates, and the Influence of the Porous Environment for Epoxidations at Lewis Acidic Metal Atoms in Zeolite BEA" **Flaherty, D.W.**; **Bregante, D.T.**; 2017 AIChE Annual Meeting; Oct. 29th, 2017; Minneapolis, MN

2. “Brushed Soft Contact Lenses for Reducing Lid-Wiper Sliding Friction” Radke, C.J.; **Bregante, D.T.**; Pang, V.; Dursch, T.J.; 2015 AIChE Annual Meeting, Nov. 10th, 2015; Salt Lake City, UT
3. “Sliding Friction Coefficient of Soft Surface-Gel Coatings for Soft Contact Lenses” Radke, C.J.; **Bregante, D.T.**; Chong, H.; Dursch, T.J.; 2015 ARVO National Meeting, May 5th, 2015; Denver, CO

Professional Experience (Past)

Analytical Operations Intern

June 2015 – Aug. 2015

Genentech, Inc.; South San Francisco, CA

- Used UHPLC-HRMS to quantify peptide oxidation under varying stress conditions
- Developed a kinetic model to predict peptide oxidation under chemical- and photo- stress
- Established and validated the automation of an antibody digestion assay used to quantify peptide oxidation

Undergraduate Student Researcher

Jan. 2014 – June 2015

University of California, Berkeley; Berkeley, CA

Advisor: Professor *Clayton J. Radke*, Department of Chemical Engineering

- Used square-gradient theory and the Peng-Robinson equation of state to calculate liquid/vapor thin-film density and stress profiles
- Measured uptake and release of small water-soluble drugs from copolymer hydrogels using fluorescence confocal microscopy
- Synthesized improved silicone-hydrogel contact lenses using amphiphilic monomers
- Established an atomic force microscopy (AFM) procedure for quantitative sliding-friction measurement of hydrogels
- Synthesized ultra-soft soft-contact-lens-material hydrogels and characterized local modulus using AFM under varying degrees of lipid spoliation
- Developed a 1-dimensional heat transfer model to extract tear-film evaporation rates from ocular-surface temperature vs time curves

Undergraduate Student Researcher

Jan. 2013 – Dec. 2013

University of California, Berkeley; Berkeley, CA

Advisor: Professor *Thomas J. Maimone*, Department of Chemistry

- Developed a procedure for the cobalt-catalyzed endo-peroxide ring opening to afford a 1,4 ene-one intermediate in the total synthesis of a naturally occurring anti-malarial cardamom peroxide
- Employed electrophilic iodine in a semi-pinacol rearrangement yielding an advanced intermediate in the total synthesis of resiniferatoxin

Laboratory Assistant II

Jan. 2012 – May 2015

University of California, Berkeley; Berkeley, CA

Department of Chemistry

- Standardized chemical solutions, calibrated pH meters, cleaned and maintained laboratory equipment
- Trained and familiarized with EH&S policies on safe lab practices and disposal of hazardous waste
- Trained new laboratory assistants in the College of Chemistry Demonstrations Laboratory

Teaching Assistantships

1. ChBE 442 – “Mass Transfer Operations” at UIUC (Fall 2017) with Prof. David Flaherty
2. Chem 3A – “Chemical Structure and Reactivity” at UC Berkeley (Summer 2014) with Dr. Steve Pedersen
3. Chem 112A – “Organic Chemistry I” at UC Berkeley (Fall 2013) with Prof. Anne Baranger

Undergraduate Mentees

- University of Illinois at Urbana-Champaign
 - Alayna M. Johnson Jan. 2017 – Present
 - Ami Y. Patel Jan. 2017 – Present
 - Katherine E. Nagode May – Nov. 2016

Professional Affiliations

- North American Catalysis Society (NACS) 2016 – Present
- Catalysis Club of Chicago (CCC) 2016 – Present
- American Institute of Chemical Engineers (AIChE) 2015 – Present
- American Chemical Society (ACS) 2014 – Present
- Tau Beta Pi, CA-Alpha Chapter (TBP) 2014 – Present

Volunteer/Outreach

- Mentees and Mentors Relationships in Research (UIUC) 2016 – Present
- Girls Adventures in Mathematics, Engineering and Science (UIUC) 2016 – Present
- Cal Alumni Association Scholarship Reviewer (UC Berkeley) 2016 – Present
- Berkeley Engineers and Mentors (UC Berkeley) 2014 – 2015

Note: last updated – Aug. 6th, 2017