Matthew J. Gilkey *curriculum vitae*

Ph.D. Candidate in Chemical & Biomolecular Engineering
University of Delaware | Catalysis Center for Energy Innovation

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Education

Ph.D.	**University of Delaware** *Chemical & Biomolecular Engineering*	**08/2013 – Present**
B.S.	**University of California, Santa Barbara** *Chemical Engineering*	**09/2009 – 06/2013**

Research Experience

Graduate Research Assistant **01/2014 - Present**
University of Delaware | Catalysis Center for Energy Innovation | Newark, DE
Advisors: *Prof. Dionisios G. Vlachos* and *Prof. Bingjun Xu*

- Design and development of hydrodeoxygenation strategies for biomass-derived platform chemicals to fuels and value-added chemicals.
- Investigation of hydrodeoxygenation mechanisms through isotopic labeling, kinetic studies, and vibrational spectroscopy to facilitate rational catalyst design.
  - Elucidated the mechanism of furfural hydrodeoxygenation to 2-methylfuran, a valuable fuel, showing the importance of metal and metal oxide phases on Ru/C catalysts.
  - Revealed key insights into the formation of adipic acid, an industrially relevant polymer precursor for nylon, from biomass derivatives, demonstrating hydriodic acid's multifaceted role in the breaking of C-O bonds.

Undergraduate Research Assistant **01/2012 – 02/2013**
University of California, Santa Barbara | Goleta, CA
Advisor: *Prof. Todd M. Squires*

- Employed microfluidic devices for precise control of chemical microenvironments to investigate rheological and mass transfer properties.
- Mapped velocity profiles of complex fluids via particle tracking velocimetry, noting the importance of channels' aspect ratios on masking a fluid's behavior.

Industrial Experience

Engineering Intern – Water Treatment Plant **05/2012 – 08/2012**
Hilmar Cheese Company | Turlock, CA

- Analyzed a multi-million gallon biodigester capable of converting solid cheese waste into more easily processed water-soluble material.
- Re-designed a one-pass chiller system by sizing plant equipment, designing control schemes, and developing process and instrumentation diagrams for plant contractors in AutoCAD.

Resource Analyst **06/2007 – 08/2013**
Tulare Lake Basin Water Storage District | Corcoran, CA

- Prepared and designed detailed water accounting documents capable of accurately allocating water deliveries to the district's water users.

Skills and Proficiencies

Analytical Techniques: Gas chromatography-mass spectrometry (GC-MS), high performance liquid chromatography with mass spectrometry (HPLC-MS), ultraviolet visible spectrophotometry (UV-Vis).

Characterization Techniques: X-ray diffraction (XRD), fourier transform-infrared spectroscopy (FT-IR), scanning electron microscopy with elemental analysis (SEM-EDX), x-ray photoelectron spectroscopy (XPS), CO chemisorption, temperature-programmed reduction (TPR), N_2 adsorption.

Modeling/Numerical Analysis: MATLAB, AspenPLUS, Wolfram Mathematica, CasaXPS, COSMO-SAC.

Graphics/Design: AutoCAD, ChemDraw, Adobe Photoshop, Inkscape, Igor.