

Griffin W. Roberts

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Education

University of Kansas (KU)

PhD Chemical Engineering 08/08- Exp. 05/15
Madison and Lila Self Graduate Fellow

Fellows are chosen for:

- Vision, career goals, and achievements
- Have shown leadership potential, motivation, and possess strong work ethic
- Have demonstrated initiative, passion for achievement and lifelong learning

Development program provides:

General education and training in communication, management, and leadership
<http://selfgraduate.ku.edu/>

University of Illinois at Urbana-Champaign (UIUC) 01/05- 12/07

B.S. Chemical Engineering
B.S. Chemistry

Parkland College (Champaign, IL) 08/02- 12/04

Research Experience

Graduate Research

Dr. Susan Stagg-Williams (KU) 08/08- Present

KU Biofuels Feedstock to Tailpipe© Initiative

- Wastewater algae utilization for environmental remediation
- Hydrothermal conversion to high-value products
- Method development for feedstock and product characterization

Center for Environmentally Beneficial Catalysis (CEBC)

- Solid acid catalysis
- Material synthesis and characterizations

Graduate Research Technician- Dr. Paul Kenis (UIUC) 01/08- 08/08

Undergraduate Research- Dr. Paul Kenis (UIUC) 05/06- 12/07

B.S. Thesis: "Microfluidic Platform for *in-meso* Crystallization of Membrane Proteins"

Microfluidics/ Microfabrication

Membrane Protein Crystallization

Undergraduate Research- Dr. Edmund Seebauer (UIUC) 05/05- 12/06

Ultra-low Vacuum Systems

Chemical Vapor Deposition

Archer Daniels Midland Co.- Decatur, IL 05/04-08/04

James R. Randall Research Center- Supervisor: Rick Grabiell

Awards

American Institute of Chemical Engineers (AIChE)

Environmental Division

(2013) 1st Place Graduate Student Paper Award

Sustainable Engineering Forum

(2013) Best Student Paper

(2012) 2nd Place Poster Competition

10th Annual Capitol Graduate Research Summit (Topeka, KS)

(2013) Monetary Award Winner

University of Kansas (Lawrence, KS)

(2012) Monetary Award KU Graduate Engineering Association Poster Competition

(2011) Monetary Award- Science & Engineering KU Graduate Research Competition

(2010) CEBC Advisory Board Meeting, Best Poster

Publications[‡]

G. W. Roberts, B. S.M. Sturm, U. H. Hamdeh, G. E. Stanton, A. Rocha, T. L. Kinsella, M.-O. P. Fortier, S. Sazdar, M. S. Detamore, S. M. Stagg-Williams, (2015) Promoting Catalysis and Hi-Value Product Streams bu *In-situ* Hydroxyapatite Crystallization during Hydrothermal Liquefaction of Microalgae Cultivated with Reclaimed Nutrients. *Green Chemistry*. Accepted Manuscript, DOI: 10.1039/c5gc00187k.

M.-O. P. Fortier, G. W. Roberts, S. M. Stagg-Williams, B. S. Sturm, (2014) Life cycle assessment of bio-jet fuel from hydrothermal liquefaction of microalgae. *Applied Energy* **122**, 73-82.

J.-H. Yun, V. H. Smith, F. J. deNoyelles, G. W. Roberts, S. M. Stagg-Williams, (2014) Freshwater Macroalgae as a Biofuels Feedstock: Mini-Review and Assessment of Their Bioenergy Potential. *Industrial Biotechnology* **10**, 212-220.

G. W. Roberts, M.-O. P. Fortier, B. S. M. Sturm, S. M. Stagg-Williams, (2013) Promising Pathway for Algal Biofuels through Wastewater Cultivation and Hydrothermal Conversion. *Energy & Fuels* **27**, 857-867, DOI: 10.1021/ef3020603.

S. L. Perry, G. W. Roberts, J. D. Tice, R. B. Gennis and P. J. A. Kenis., (2009) Microfluidic Generation of Lipidic Mesophases for Membrane Protein Crystallization, *Crystal Growth & Design*, **9** (6), 2566–2569.

‡ Intended Submittals:

- Mining Municipal Wastewater for Energy, Fertilizers, Absorbents, and Catalysts
 - Novel Approach for Simultaneous Protein, Lipid, and Carbohydrate Determination of Algae through TGA-Char-IR
 - Identification and Quantification of Sugar and Oil from Arkansas Native Algae
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Patent Publication

P.J.A. Kenis, S.L. Perry, J.D. Tice, and G.W. Roberts. *Microfluidic device for preparing mixtures*. U.S. Patent 7976789, July 12, 2011.

G.W. Roberts, S.M. Stagg-Williams, B.S.M. Sturm. *Process for the production of hydroxyapatite and biocrude oil*. U.S. prov. application, 2015. In draft.

Oral Conference/ Research Presentations

Presenting author indicated by an underline

M-O. P. Fortier, G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams. *Land use change impacts by cultivation location: a geographic life cycle assessment of biofuels from wastewater algae*, Algae Biomass Summit, San Diego, Oct. 2014.

M-O. P. Fortier, G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams. *Life cycle assessment of bio-jet fuel from hydrothermal liquefaction of microalgae*, International Conference on Algal Biomass, Biofuels and Bioproducts, Toronto, Ontario, Canada, June 2013.

G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Hydrothermal Liquefaction of Wastewater Derived Green Alga*, AIChE National Meeting, San Francisco, Nov. 2013.

G. W. Roberts, A. Gupta, M-O. P. Fortier, A. Rocha, T. L. Kinsella, B. S.M. Sturm, E. Peltier, S. M. Stagg-Williams, *Mining Municipal Wastewater for Fertilizers and Catalysts After Crude Oil Extraction*, AIChE National Meeting, San Francisco, Nov. 2013.

B. S.M. Sturm, G. Chen, G. W. Roberts, S. M. Stagg-Williams, *The Relationship Between Growth Phase, Macromolecular Content, and Biocrude Yield For Chlorella Kessleri*, AIChE National Meeting, San Francisco, Nov. 2013.

M-O. P. Fortier, G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams, *Life Cycle Assesment of Bio-Jet Fuel From Hydrothermal Liquefaction of Microalgae*, AIChE National Meeting, Pittsburg, Nov. 2012.

G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Thermochemical Conversion to Biocrude From Pilot Scale Grown Wastewater Fed Algae*, AIChE National Meeting, Pittsburg, Nov. 2012.

G. W. Roberts, S. M. Stagg-Williams, B S.M. Sturm, *Biocrude from pilot wastewater fed algal systems*, ACS National Meeting, Philadelphia, Aug. 2012.

G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams, April 17, 2012. *Hydrothermal Liquefaction: Wastewater Fed Algae to Bio-crude*. International Biomass Conference and Expo, Denver, April 2012.

G. W. Roberts, S. M. Stagg-Williams, *Layered Solid Acid Catalysts for the Production of Biofuels from Algal Lipids*, AIChE National Meeting, Salt Lake City, Nov. 2010.

G.W. Roberts, S.L. Perry, J.D. Tice, and P.J.A. Kenis, *Microfluidic Platforms for In-Meso Membrane Protein Crystallization*, AIChE National Meeting, Salt Lake City, Nov. 2007.

S.L. Perry, S. Talreja, G.W. Roberts, J.D. Tice, R.B. Gennis, C.F. Zukoski, and P.J.A. Kenis, *Microfluidic Platforms for Membrane Protein Crystallization*, AIChE National Meeting, Salt Lake City, Nov. 2007.

P.J.A. Kenis, S.L. Perry, G.W. Roberts, S. Talreja, J.D. Tice, R.B. Gennis, and C.F. Zukoski, *Microfluidic Approaches to Membrane Protein Crystallization*, NIH Roadmap: Membrane Protein Production & Technologies Meeting, La Jolla, Nov. 2007.

P.J.A. Kenis, S.L. Perry, J.D. Tice, and G.W. Roberts, *Microfluidic Chips for (Membrane) Protein Crystallization*, μTAS 2007 Conference, Paris, Oct. 2007.

P.J.A. Kenis, S.L. Perry, J.D. Tice, and G.W. Roberts, *Microfluidic Platforms for Membrane Protein Crystallization*, ACA National Meeting, Salt Lake City, Jul. 2007.

G.W. Roberts, S.L. Perry, S. Talreja, J.D. Tice, and P.J.A. Kenis, *Microfluidic Platforms for Membrane Protein Crystallization*, UIUC Undergraduate Research Symposium sponsored by the Women Chemists Committee, Urbana, April 2007.

P.J.A. Kenis, J.D. Tice, S.L. Perry, S. Talreja, G.W. Roberts, R. Gennis, and C.F. Zukoski, *Microfluidic Platforms for Membrane Protein Crystallization*, AIChE National Meeting, San Francisco, Nov. 2006.

Invited Guest Lectures

Griffin W. Roberts, 2014, “Alternative Route for Transportation Fuels”, University of Kansas, Dept. of Chemical and Petroleum Engineering, CPE 117- Energy in the Modern World.

Poster Conference/ Research Presentations

Presenting author indicated by an underline

*denotes a mentored undergraduate

M-O. P. Fortier, G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams. *Life cycle assessment of bio-jet fuel from hydrothermal liquefaction of microalgae*, Association of Environmental Engineering & Science Professors (AEESP) 50th Anniversary Conference, Golden, July 2013.

T. Bracken, T. J. Benson, G. W. Roberts, M-O. P. Fortier, S. M. Stagg-Williams, B. S.M. Sturm and H. Raza, *Aspen Simulation for Hydrothermal Liquefaction of Algae to Generate Fuels and Chemicals*, AIChE National Meeting, San Francisco, Nov. 2013.

*U. H. Hamdeh, G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, D. J. Carrier, S. M. Stagg-Williams, *Comparing Hydrothermal Liquefaction of Algae Cultivated in Different Municipal Wastewater*, AIChE National Meeting, San Francisco, Nov. 2013.

*A. Rocha, G. W. Roberts, T. L. Kinsella, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Pyrolysis Decomposition Analysis of Wastewater Derived Microalgae Via TGA-FTIR*, AIChE National Meeting, San Francisco, Nov. 2013.

G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Comparison of Biocrude from Micro- and Macroalgae*, AIChE National Meeting, Pittsburg, Nov. 2012.

G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Biocrude production from pilot scale wastewater grown algae*, U.S. Dept. of Energy Biomass 2012: Confronting Challenges, Creating Opportunities, Washington D.C., July 2012.

G. W. Roberts, B. S.M. Sturm, S. M. Stagg-Williams, *Hydrothermal Liquefaction of Wastewater Fed Algae to Bio-crude*, 2nd International Conference on Algal Biomass, Biofuels and Bioproducts, San Diego, June 2012.

G. W. Roberts, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Wastewater Fed Algae: Hydrothermal Liquefaction to Bio-crude*, University of Kansas Graduate Engineering Association Competition. 2nd Place. April 2012.

G. W. Roberts, K. Walker, M-O. P. Fortier, B. S.M. Sturm, S. M. Stagg-Williams, *Feedstock-to-Tailpipe: Algae to liquid fuels*, AIChE National Meeting, Minneapolis, Nov. 2011.

G. W. Roberts, S. M. Stagg-Williams, *Feedstock-to-Tailpipe: A Catalysis Approach*, University of Kansas Graduate Research Competition. 1st Place. March 2011.

G. W. Roberts, S. M. Stagg-Williams, *Designer Solid Acid Catalysts for Producing Biofuels from Algal Oils*, AIChE National Meeting, Salt Lake City, Nov. 2010.

G. W. Roberts, S. M. Stagg-Williams, *Laminar Solid Acid Catalysts for the Production of Biofuels from Algal Lipids*, AIChE National Meeting, Nashville, Nov. 2009.

S.L. Perry, G.W. Roberts, S. Talreja, J.D. Tice, C.F. Zukoski, R.B. Gennis, and P.J.A. Kenis, *Microfluidic Platforms for Membrane Protein Crystallization: Evaporation and In-Meso Approaches*, AIChE National Meeting, Salt Lake City, Nov. 2007.

Invited Presentations- Dr. Susan M. Stagg-Williams

Presentations given by my PhD advisor discussing the results of my primary research

International

Susan M. Stagg-Williams, “Liquefaction of Algae for Biocrude Production”, 9th World Congress of Chemical Engineering, Seoul, South Korea, Aug 20, 2013.

Susan M. Stagg-Williams, “A Feedstock to Tailpipe Approach to Biofuel Production from Algae”, US-Indo Workshop - Emerging Issues in National Energy and Environmental Security: Research Opportunities and Challenges for Chemical Engineers’, November, 2010, New Delhi, India.

National

Susan M. Stagg-Williams, “Hydrothermal Liquefaction of Wastewater-fed Algae”, Multi-state Energy Research Planning Meeting, Little Rock, Ar, June26-27, 2013.

Susan M. Stagg-Williams, “Hydrothermal Liquefaction of Wastewater-fed Algae”, North Carolina A&T State University, Greensboro, NC, February 14, 2013.

Susan M. Stagg-Williams, Griffin Roberts, Belinda Sturm, “Wastewater-fed Algae: Hydrothermal Liquefaction to Biocrude”, International Biomass Conference, Denver, CO April 16-19, 2012.

Susan M. Stagg-Williams, “A Feedstock to Tailpipe Approach to Biofuel Production from Algae”, Oklahoma State University, Stillwater, OK, Sept 20, 2011.

Susan M. Stagg-Williams, “Biofuel Production: A Feedstock to Tailpipe Approach”, Northeastern State University, Tahlequah, OK, September, 15, 2010.

Susan M. Stagg-Williams, “Feedstock to Tailpipe: Alternative Fuel for the Future”, Benedictine College, Atchison, KS April 2009.

Susan M. Stagg-Williams, “Heterogeneous Catalysis for the Production of Alternative Fuels”, Chemistry Departmental Seminar Series, February 11, 2005, Pittsburgh State University, Kansas.

Undergraduate Research Mentoring

Managed team(s) of undergraduate researchers in the area of algae biofuels. Managed teams of 3-7 undergraduates each collegiate semester which performed feedstock analysis, algae conversion through hydrothermal liquefaction, and product characterization(s). Summer months involved larger teams consisting of undergraduates from KU and other universities through the NSF Research Experience for Undergraduates (REU) Program.

1. Mark LaFollette, Chemical Engineering major
2. James Miller, Chemical Engineering major
3. Shayan Sazdar, Chemical Engineering major, Missouri University of Science and Technology
4. Karl Aldreks, Chemical Engineering major, Iowa State University
5. Ann Eddy, Chemical Engineering major
6. Tiffany Hobson, Chemical Engineering major
7. Umar Hamdeh, BS Chemical Engineering
8. Alejandra Rocha BS Chemical Engineering
9. Gabriel Stanton BS Chemical Engineering
10. Caroline Jarmoc BS Chemical Engineering
11. Eddie Munoz BS Chemical Engineering
12. Robbie Hable, BS Chemical Engineering, Iowa State University
13. Jake Garrett, BS Chemical Engineering

14. Andrew Dougherty, BS Chemical Engineering, Washington University St Louis
15. Alexander Keeling, Syracuse University
16. Elizabeth Murray, Columbia University
17. Cody Siroka, University of Massachusetts-Amherst
18. Francie Fangman, BS Chemical Engineering
19. Lauren Crandon, BS Chemical Engineering
20. Juan Saganome (Columbian exchange student)
21. Kara Walker, BS Chemical Engineering
22. Jeff Hoffman, BS Chemical Engineering
23. Kristen Loftus, BS Chemical Engineering

REU Poster Presentations

Posters presented by mentored undergraduates during the summer REU Program

2014

Shayan Sazdar - “Investigation of biochar calcium orthophosphates from algal hydrothermal liquefaction”

Mark LaFollette, James Miller - “A study of hydrothermal liquefaction using wastewater and marine algae”

2013

Karl Alderks - “Biocrude extraction from hydrothermal liquefaction of wastewater cultivated algae”

Gabriel Stanton - “Scale up of hydrothermal liquefaction of algae”

2012

Andrew Dougherty - “Characterization and application of algal biochar: soil amendment and catalytic surface potential”

Alexander Keeling - “Impact of growth conditions and growth phases on algal cellular content”

Robert Hable, Umar Hamdeh, Jake Garrett - “Hydrothermal liquefaction of wastewater algae”

Elizabeth Murray - “Microalgae preconcentration by sedimentation and by addition of montmorillonite clay coagulant”

Cody Siroka - “Nutrient Recycling and algae growth with aqueous co-product from hydrothermal liquefaction”

Advanced Analytics and Systems Operations Fluency

Including:

*Method development

‡ Hardware repair

Gas Chromatography- Mass Spectrometer/ Flame Ionization/ Thermal Conductivity (GC- MS/FID/TCD) * ‡

Fourier Transform Infrared Spectrometry (FTIR) * ‡

Thermogravimetric Analysis (TGA) *

Inductively Coupled Plasma- Optical Emission Spectrometry (ICP-OES)

X-Ray Diffraction (XRD)

Carbon, Hydrogen, Nitrogen, Oxygen Analysis (CHNO) ‡

Micromeritics Equipment: ‡

Chemisorption *

Temperature Programmed Desorption/ Reduction/ Oxidation (TPD/R/O) *

BET/ BJH Surface Area Analysis ‡

High Pressure and Temperature Systems * ‡

Ultra-low vacuum systems ‡

Microfluidics * ‡

Teaching Assistantships

University of Kansas, Department of Chemical & Petroleum Engineering (CPE)

Fall 2014

CPE 211 - Material and Energy Balances

Spring 2014

CPE 624 - Plant and Environmental Safety

Fall 2013

CPE 211 - Material and Energy Balances

Spring 2013

CPE 121 – Introduction to Computers in Engineering

Community Involvement and University Relations

University of Kansas Biofuels Feedstock-to-Tailpipe © Representative

Provide informational tours of laboratory facilities including biodiesel pilot plant, biofuels research, algae cultivation greenhouse and laboratory bioreactors, fuel characterization and analytical laboratory, and emission analysis laboratory all housed in the National Institute of Standards and Technology (NIST) funded Measurements, Materials and Sustainable Environment Center (M2SEC). Previous tour guest have included:

Dr. Willie E. May	Director of NIST
Dr. Daniel G. Friend	NIST Technical Program Director, Energy
Dr. S. Shyam Sundar	NIST Senior Advisor for Laboratory Programs

Candidates for the KU School of Engineering Dean position
KU CPE faculty candidates
Various KU engineering department advisory boards

University of Kansas Carnival of Chemistry Participant (Since 2008)

A publically open event on KU campus focusing on chemical education and fun guided towards young boys and girls, age 1-12. Various experimental demonstrations are performed which introduce different chemistry related phenomena and represent larger real world problems and/or applications. Contact Claudia Bode: bode@ku.edu
<http://cebc.drupal.ku.edu/hands-chemistry-takes-their-breath-away-annual-carnival>

Organization Memberships

American Institute of Chemical Engineers (AIChE)

Graduate member since 2009
Undergraduate Member 2005-2007

American Chemical Society (ACS) 2012

Grant Contributions

(2014) National Science Foundation award #1438652

3-year; \$409,653

- Work was derived directly from my Ph.D. research
 - I significantly contributed to writing and the direction of proposed research
-

Peer Review Referee

Peer reviewed journals I have served for as a reviewer

Bioresource Technology (Elsevier)

Environmental Science: Processes & Impacts (Royal Society of Chemistry)