

Karla S. McCain
Austin College
Department of Chemistry
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Professor of Chemistry, 2016-present
Rupert B. Lowe Endowed Chair in Chemistry, 2015-present
Director of Accreditation and Assessment, 2013-present
Associate Professor of Chemistry, 2009-2016
Assistant Professor of Chemistry, 2003-2009
Austin College, Sherman, Texas

Ph.D., 12/ 2003, Physical/Analytical Chemistry
University of Utah, Salt Lake City, Utah.

B.A., 5/1998, Chemistry major/ Mathematics minor
Ohio Wesleyan University, Delaware, Ohio

Teaching

General Chemistry I and II

- Introductory course taught largely to freshmen interested in majoring in the sciences or pursuing a pre-medical curriculum
- Student assessment includes homework, quizzes, and exams; in class problem solving is used extensively to promote critical thinking

Analytical Chemistry

- Upper level course taught to junior and senior chemistry and biochemistry majors
- Student assessment includes weekly reviews of the primary chemical literature, practical laboratory skills, lab report and proposal writing, and exams; fulfills college requirement for a writing intensive course
- Course is organized around the steps of performing a chemical analysis and their application to different types of samples (organic, metallic, biological); includes some exposure to classic wet methods and extensive exposure to instrumental methods

Women and Science

- Taught as C/I, a freshmen seminar course as a course to fulfill college science without a lab requirement
- Multidisciplinary approach considering the historical contributions of women to science, feminist philosophy of science, social science approaches to the underrepresentation on women in science, and policy responses.
- In 2012, was linked to Philosophy 211, Feminist Thought, as part of the Mellon Course Partnerships

Leadership and Service

Off Campus

- Society for Applied Spectroscopy
 - 2010 - present, delegate to Governing Board
 - 2013 - 2014, Membership Chair and member of Executive Committee
- Reviewer for *Applied Spectroscopy*, *Journal of Physical Chemistry*, *Analytical Chemistry*, various Royal Society of Chemistry journals, and the National Science Foundation
- Reviewer for 2003 National Conference on Undergraduate Research, Salt Lake City
- Supervisor of Supplemental Instruction Program at the University of Utah, 1999-2001.
- Associate Director for the Supplemental Instruction Program at the University of Utah, 2001.

On campus

- co-led 3 day faculty workshop on “Cross-Disciplinary Pedagogy: Approaches, Application, and Reflection” 2014, 2015
- led various faculty development lunch sessions
- STAR Leadership steering committee, assessment coordinator, 2013 - present
- High Impact Practices committee as part of Johnson Center 2012 - 2014
 - co-led a session during spring workshop week for faculty, 2013
 - co-led a session during fall workshop for student affairs, 2013
- Austin College Student Scholarship Conference, 2012-13
- Member of planning group for HHMI submissions in 2011 and 2007
- Faculty Executive Committee, 2010
- Institutional Effectiveness Committee 2009 - present
- Gender Studies Steering Committee, 2006 - present
- Environmental Studies Steering Committee, 2004 - 2008
- AC Science Division Undergraduate Poster Symposium organizing committee, 2004-present, chair 2005-2011
- Faculty sponsor for Muslim Student Association 2006 - 2008
- Presidential Scholarship Committee, 2003 - 2009

In Department

- Chemistry Seminar Series organizer, 2007-2009
- Point person for general chemistry lab, total of 6 semester from 2005-2009
- Responsible for coordination of departmental assessment, 2009-2016
- Administrator of Welch grant, managing budget of \$35,000 per year, 2009 - 2013

Honors and Awards

- *Austin College Science Division Service Award*, 2016
- *Austin College Science Division Teaching Award*, 2009
- *Outstanding Poster Award*, FACSS, 2007.
- *University of Utah Graduate Fellowship*, University of Utah, 2001
- *Novartis Graduate Fellowship*, University of Utah, 2001

- *Dow Chemical 1st Year Scholarship*, University of Utah, 1999
- *Department of Education Fellowship*, University of Utah, 1998
- *University Incoming Graduate Student Award*, University of Utah, 1998.
- *Henry Eyring Research Fellowship*, University of Utah, 1998
- *ACS Undergraduate Analytical Chemistry Award*, Ohio Wesleyan University, 1998

Conferences/Workshops Attended for Professional Development

- ACE Regional Women's Leadership Forum, 2015
- AACU Annual Meeting, 2014, 2015
- COACH Workshop "COACHing Strong Women in the Art of Strategic Persuasion" 2014
- American Conference of Academic Deans/Phi Beta Kappa Biennial Conference "Is There a Case for the Liberal Arts?" 2013
- SACS COC Summer Institute on Quality Enhancement and Accreditation, 2013
- AACU/PKAL Network for Academic Renewal STEM conference, 2012
- AACU Institute on Integrative Learning and the Departments, 2012
- SACS COC Annual Meeting 2011, 2012, 2014
- Council for Undergraduate Research Proposal Writing Institute, 2005

Professional Associations

- American Chemical Society, Analytical Division and Chemical Education Division.
- Society for Applied Spectroscopy
- Coblenz Society (vibrational spectroscopy)
- Council for Undergraduate Research
- Association for Women in Science
- Associate member of Association of American Colleges and Universities

Research

(bold indicates undergraduate co-authors)

External Funding

"Using Spectroscopy to Probe Structure-Function Relationships Driven by Intermolecular Interactions: An Undergraduate Research Program to Prepare Students for Their Futures"
Discovery Foundation, **\$58,500**

Publications

K.E. Reed; D.P. Aiello; L.F. Barton; S.L. Gould; K.S. McCain; J.M. Richardson
"Integrating Leadership Development Throughout the Undergraduate Science Curriculum"*J. Coll. Sci. Teach.*, **2016**, *45*, 51-59.

K.S. McCain “Overcoming the Department Bully: Women, Men, and Collaboration” accepted for *Surviving Sexism in Academia: Strategies for Feminist Leadership*, 2015, under contract with Routledge.

J. L. Gray; C.M. Barnes; A.J. Carr; K.S. McCain “Effect of Hydrogen Bonding on the Amide II Band of Model Disubstituted Urea Compounds” *Appl. Spec.* **2009**, *63*, 1409-1413.

A.M. Pierce; P.J. Maslanka; A.J. Carr; K.S. McCain “Using FT-IR to Examine Structure in Bisurea Organogels” *Appl. Spec.* **2007**, *61*, 379-387.

K.S. McCain; **P. Schluesche;** J.M. Harris “PAMAM Dendrimers as Nanoscale Diffusion Probes in Sol-Gel Films Investigated by Total-Internal-Reflection Fluorescence Spectroscopy” *Anal. Chem.* **2004**, *76*, 939-946.

K.S. McCain; **P. Schluesche;** J.M. Harris “Modifying the Adsorption Behavior of PAMAM Dendrimers at Silica Surfaces Investigated by Total-Internal-Reflection Fluorescence Correlation Spectroscopy” *Anal. Chem.* **2004**, *76*, 930-938.

K.S. McCain; D.C. Hanley; J.M. Harris “Interpreting Single Molecule Trajectories Applied to Investigating Spatial Heterogeneity in Sol-Gel Films” *Anal. Chem.* **2003**, *75*, 4351-4359.

K.S. McCain; J.M. Harris “Total Internal Reflection Fluorescence Correlation Spectroscopy Study of Molecular Transport in Thin Sol-Gel Films” *Anal. Chem.* **2003**, *75*, 3616-3624.

Invited Lectures

“Using FT-IR to Investigate Structure/Function Relationships and Mechanism in Bisurea Organogels” September 18, 2009 at the Baylor University

“Using FT-IR to Investigate Structure/Function Relationships and Mechanism in Bisurea Organogels” January 28, 2009 at the University of Houston

“Why are women underrepresented in science? Evidence for and against 5 common hypotheses” American Chemical Society local section meeting for DFW, February 26, 2014.

“Why are women underrepresented in science? Evidence for and against 5 common hypotheses” Keynote speaker at Women in Chemistry luncheon at Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, November 21, 2014.

“Why are women underrepresented in science? Evidence for and against 5 common hypotheses” Keynote speaker at Women in Intellectual Property Law breakfast Texas Bar Association’s 26th Annual Advanced Intellectual Property Law Course, Houston, TX, March 19, 2014.

“Why are women underrepresented in science? Evidence for and against 5 common hypotheses” scheduled for Pacifichem 2015, Honolulu, HI, December 16, 2015.

Presentations (bold indicates undergraduate co-authors)

K.S. McCain; A.J. Carr; J.M. Richardson, B.W. Smucker, “Teaching interdisciplinary connections as a chemist: Mellon course partnerships at Austin College” Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, November 21, 2014.

K.S. McCain “Careers at Primarily Undergraduate Institutions: Teaching, Research, and Service” Pittcon 2014, Chicago, IL, March 6, 2014.

K.S. McCain “Why are women underrepresented in science?” SciX 2013 (meeting of the Federation of Analytical Chemistry and Spectroscopy Societies), Milwaukee, WI, October 3, 2013.

K.S. McCain “Starting with the Sample: A New Approach to a First Course in Analytical Chemistry” 2011 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Reno, October 3, 2011.

K.S. McCain “Starting with the Sample: A New Approach to a First Course in Analytical Chemistry” 2011 meeting of the Society of Western Analytical Professors, Riverside, January 28-29, 2011.

K.S. McCain; **H.E. Messamore**; A.J. Carr “Measuring Diffusion in Bisurea Organogels” accepted for presentation at 2009 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Louisville, October 21, 2010.

K.S. McCain “Incorporating Primary Literature in the Undergraduate Analytical Curriculum” 2009 meeting of the Society of Western Analytical Professors, San Jose, January 16-17, 2009.

K.S. McCain; **A.M. Pierce**; **E.P.M. Kuo**; **P.E. Frederick**; A.J. Carr “Using FT-IR and UV-vis Light Scattering to Examine the Effect of Tail Length on the Enthalpy of Bisurea Organogel Melting” 2007 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Memphis, October 18, 2007.

K.S. McCain; **C.M. Barnes**; **J.L. Gray**; A.J. Carr “Examining the Effect of Tail Length on Bisurea Organogel Structure Using FT-IR” 2007 meeting of the Society of Western

Analytical Professors, Tucson, January 26-27, 2007.

K.S. McCain; A.J. Carr; **A.M. Pierce; J. Tai** “Kinetics of Gel Formation for a C22 Tailed Bisurea Organogelator Examined by FT-IR” 2006 Pittsburgh Conference Analytical Chemistry and Applied Spectroscopy, Orlando, March 12-17, 2006

K.S. McCain; **L.M. Hinkle** “Using ATR-FTIR Spectroscopy to Investigate Humic Acid/Metal Binding Equilibria” 2005 meeting of the Society of Western Analytical Professors, Ft. Collins, January 14-15, 2005.

K.S. McCain; **A.G. Newton** “Vibrational Spectroscopy of Humic Acids” 2004 meeting of the Society of Western Analytical Professors, Salt Lake City, January 16-17.

K.S. McCain; **P. Schluesche**; J.M. Harris “Modifying the Adsorption of PAMAM Dendrimers by End Group Derivatization for Use as Nanoscale Diffusion Probes” invited talk at 2003 Spring National Meeting of the American Chemical Society, New Orleans, March 23-27.

K.S. McCain; **P. Schluesche**; J.M. Harris “Dye-Labeled PAMAM Dendrimers as Nanoscale Diffusion Probes in Sol-Gel Films” invited talk at 2002 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, October 15, 2002.

K.S. McCain; D.C. Hanley; J.M. Harris “Observing Molecular Transport in Thin Sol-gel Films by Total Internal Reflection Fluorescence Spectroscopy” invited talk at 2001 Southeast Regional Meeting of the American Chemical Society, Savannah, September 24, 2001.

K. S. McCain; J. M. Harris “Examining Molecular Transport through Sol-gel Films by Total Internal Reflection Fluorescence Correlation Spectroscopy” 2000 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Nashville, September 24, 2000.

Co-Authored Presentations (bold indicates undergraduate co-authors)

D. Medford, S.D. Prinslow, K.S. McCain “Monitoring click reactions on titanium dioxide using ATR infrared spectroscopy” Joint Southeast-Southwest Regional Meeting of the American Chemical Society, Memphis, TN, November 7, 2015.

H. Gao, A.J. Carr, K.S. McCain “Characterizing structure-function relationships in bisurea organogelators using infrared spectroscopy” Joint Southeast-Southwest Regional Meeting of the American Chemical Society, Memphis, TN, November 7, 2015.

S. D. Prinslow, K.S. McCain “Increasing dye-sensitized solar cell efficiency by controlling dye orientation: Preparation and *in situ* characterization of dye precursors by IR Spectroscopy” Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, November 21, 2014.

D. D. Beamon, K.S. McCain “Increasing dye-sensitized solar cell efficiency by controlling dye surface concentration: Preparation and *in situ* characterization of model dyes by IR Spectroscopy” Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, November 21, 2014.

I.J. DeWitt, J. Banks, K.S. McCain “Chemical analysis of the contents of a doctor's bag belonging to a north Texas doctor in the early 20th century” Southwest Regional Meeting of the American Chemical Society, Fort Worth, TX, November 21, 2014.

I. DeWitt, C. Ritchie, R. Wright, A.J. Carr, K.S. McCain “Using infrared spectroscopy to examine structure-function relationships in a new class of bisurea organogelators with branched ester tails” Spring National Meeting of the American Chemical Society, Dallas, TX, March 17, 2014.

K.T. Wattenbarger, A.J. Carr, K.S. McCain “Using infrared spectroscopy to examine the effect of branch and linker lengths on the properties of trialkylsilyl bisurea organogelators” Spring National Meeting of the American Chemical Society, Dallas, TX, March 17, 2014.

C. G. McKenas, K.S. McCain “Analysis of Silane Based Monolayers on TiO₂ Surfaces via *in situ* FT-IR Spectroscopy” SciX 2013 (meeting of the Federation of Analytical Chemistry and Spectroscopy Societies), Milwaukee, WI, October 3, 2013.

C. G. McKenas, K.S. McCain “Analysis of Carboxylate Based Monolayers on TiO₂ Surfaces by FT-IR Spectroscopy” SciX 2012 (meeting of the Federation of Analytical Chemistry and Spectroscopy Societies), Kansas City, MO, October 4, 2012.

J. Quiring, A.J. Carr, K.S. McCain “Examining structure-function relationships in branched silane-based organogelators using infrared spectroscopy” 2012 Rocky Mountain Regional Meeting of the American Chemical Society, Denver, CO, October 19, 2012.

C. Herrera; K.S. McCain “Developing an *in situ* method to characterize the reaction of silanes to titanium dioxide using attenuated total reflectance infrared spectroscopy” 2012 Rocky Mountain Regional Meeting of the American Chemical Society, Denver, CO, October 19, 2012

C. G. McKenas, K.S. McCain “Characterizing monolayers of carboxylate based surface bound ligands using IR spectroscopy” 2011 Southwest Regional Meeting of the American Chemical Society, Austin, TX, November 10, 2011.

N.J. Inman , K.S. McCain “Using IR spectroscopy to characterize monolayers of silane based surface bound ligands” 2011 Southwest Regional Meeting of the American Chemical Society, Austin , TX, November 10, 2011.

A. Clubb, K.S. McCain “Using Infrared Spectroscopy to Examine Organogelation in Mixed Organic and Water Systems” 2010 Midwest Regional Meeting of the American Chemical Society, Wichita, KS, October 27-30, 2010.

A. Kiehl, K.S. McCain “Measuring Diffusion Rates in Organogel Materials Using UV-vis Spectroscopy” 2010 Midwest Regional Meeting of the American Chemical Society, Wichita, KS, October 27-30, 2010.

J. Berger, K.S. McCain “IR Spectroscopy of Arylcyclohexanol Organogels” 2010 Midwest Regional Meeting of the American Chemical Society, Wichita, KS, October 27-30, 2010.

A. Castner; K.S. McCain “The General Importance of Conformational Defects in Organogel Formation” 2008 Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 4, 2008.

S. Suhag; S.Y. McGill; K.M. Wiggins; A.J. Carr; K.S. McCain “The Effects of Carbon Linker Length of Bisurea Organogelator on Gel Organization and Structure Examined by FT-IR” 2008 Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 3, 2008.

S.Y. McGill; S. Suhag; A.J. Carr; K.S. McCain “Kinetics of Gel Formation of Bisurea Organogelators Examined by Fourier Transform Infrared (FT-IR) Spectroscopy” 2008 Southwest Regional Meeting of the American Chemical Society, Little Rock, AR, October 3, 2008.

E.P.M. Kuo; P.E. Frederick; C.M. Barnes; A.J. Carr; K.S. McCain "Thermodynamic Characterization of C6 Bisurea Organogelators with Varying Tail Lengths Using FT-IR Spectroscopy and UV-Vis Light Scattering" 2007 Southwest Regional Meeting of the American Chemical Society, Lubbock, October 20, 2007.

H.E. Messamore; A.J. Carr; K.S. McCain "The Effect of Solvent Length on the Structure of Bisurea Organogels Examined by FT-IR" 2007 Southwest Regional Meeting of the American Chemical Society, Lubbock, October 20, 2007.

P.E. Frederick; E.P.M. Kuo; A.J. Carr; K.S. McCain “The Effect of Cooling Rate on the Structure and Properties of Bisurea Organogels by FT-IR" 2007 Southwest Regional Meeting of the American Chemical Society, Lubbock, October 20, 2007.

C.M. Barnes; J.L. Gray; A.J. Carr; K.S., McCain "Examining the Effect of Tail Length on Bisurea Organogel Structure Using FT-IR" 2006 Southwest Regional Meeting of the American Chemical Society, Houston, October 20, 2006.

J.L. Gray; C.M. Barnes; A.J. Carr; K.S. McCain "Systematic Study of Hydrogen Bonding in Model Urea Compounds using FT-IR" 2006 Southwest Regional Meeting of the American Chemical Society, Houston, October 20, 2006.

J.M. Cohen; T.D. Talamantes; A.M. Pierce; J. Tai; A.J. Carr "Examining Gelation Kinetics in a C22-tailed Bisurea Organogelator by FT-IR" 2006 Southwest Regional Meeting of the American Chemical Society, Houston, October 20, 2006.

A.M. Pierce; K.S. McCain "Determining Structural Order in Bisurea Organogelators by FTIR" 2006 Pittsburgh Conference Analytical Chemistry and Applied Spectroscopy, Orlando, March 12-17, 2006.

C.B. Grissom; R.A. Horton; K.S. McCain; J.M. Harris "Intracellular Trafficking of Enzymatic Cofactors: Visualizing Cobalamin at the Single-Molecule Limit" American Society of Biochemistry and Molecular Biology Meeting, San Diego, April 4, 2005.

L. Hinkle; K.S. McCain "pH Dependent Humic Acid/Metal Binding Investigated by Fourier Transform Attenuated Total Reflectance Infrared Spectroscopy" 2004 Southwest Regional Meeting of the American Chemical Society, Ft. Worth, September 2, 2004.

J.M. Harris; D.L. Hanley; M.L. Houlne; K.S. McCain; **C.J. Sjostrom** "Spectroscopic Characterization of Nanomaterials at the Single-Particle and Single-Molecule Level" Symposium on Analytical Chemistry of Nanomaterials, 2002 Pittsburgh Conference, New Orleans, March 18, 2002.

J.M. Harris; D.L. Hanley; K.S. McCain; **P. Schleusche** "Studies of Labeling and Transport in Sol-Gel Materials using Single-Molecule Fluorescence Spectroscopy" Symposium on Single-Molecule Detection, 2002 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, October 14, 2002.

J.M. Harris; D. Rivera; K.S. McCain; D.L. Hanley "Silica-Coated Internal-Reflection Elements for Studies of Molecular Adsorption, Binding, and Interfacial Transport in Sol-Gel Materials" Symposium on Spectroscopy at Interfaces, Symposium on Spectroscopy at Interfaces, 2001 meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Detroit, October, 10, 2001.

D. Rivera; K.S. McCain; J.M. Harris "Silica-Coated Internal Reflection Elements for the Study of Molecular Adsorption, Binding, and Transport in Sol-Gel Materials" 2000 Pittsburgh Conference, New Orleans, March 15, 2000.

J.M. Harris; D. Rivera; K.S. McCain “Internal Reflection Spectroscopy Studies of Retention Mechanisms and Chromatographic Interfaces” 24th International Symposium on High Performance Liquid Phase Separations, Seattle, June 27, 2000.