# **Contact Information & Public Profiles**

Department of Chemistry Missouri University of Science and Technology (Missouri S&T) 400 West 11<sup>th</sup> Street, Rolla, MO 65409-0010 (573) 341-4432 woelk@mst.edu http://people.mst.edu/faculty/woelkk

### Administrative and Academic Competencies

Broad-based expertise in many facets of higher education — experience in departmental leadership, budget development, and facilities administration in times of academic transformation and administrational changes - effective in program growth and program performance evaluation - proactive in systematic program development, collaborative initiatives, and conference organization — successful development and expansion of campus facilities for specialized research — leadership in research programs and experiential learning initiatives for undergraduate students of all disciplines on campus - key scholarly contributions in physical chemistry and NMR spectroscopy - recognized for developing and implementing campus-wide solutions to key issues in student success, student-faculty interaction, and faculty development.

### Education

"Habilitation" (formerly required for securing a tenured position in Germany) in Physical Chemistry, Thesis: Toroid Cavity Detectors in NMR Spectroscopy and NMR Microscopy, University of Bonn (Universität Bonn), Germany

- PhD, Summa cum laude, Physical Chemistry, University of Bonn, Germany, Thesis: Induced Nuclear Spin Polarization During Catalytic Hydrogenations with Parahydrogen (advisor: Joachim Bargon)
- M.S. in Chemistry, Summa cum laude, University of Bonn, Germany, Thesis: Nuclear-Magnetic-Resonance Investigations of Chemical Reactions with Spin-Polarized Hydrogen (advisor: Joachim Bargon)
- B.S. in Chemistry, Summa cum laude, University of Bonn, Germany

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| Employment        |   |  |  |  |
|-------------------|---|--|--|--|
| 2014 – 2016       | Associate Department Chair, Chemistry, Missouri S&T   |  |  |  |
| 2011 – 2014       | Department Chair, Chemistry, Missouri S&T   |  |  |  |
| 2009 – 2011       | Assistant Department Chair, Chemistry, Missouri S&T   |  |  |  |
| 2003 – present    | Tenured Associate Professor, Chemistry, Missouri S&T  |  |  |  |
| 2000 – 2003       | Associate Professor, Physical Chemistry, University of Bonn, Germany  |  |  |  |
| 1994 – 2000       | Assistant Professor, Physical Chemistry, University of Bonn, Germany  |  |  |  |
| 1992 – 1994       | Postdoctoral Research Associate, Chemical Technology Division, Argonne National Laboratory, Argonne, IL   |  |  |  |
| 1988 – 1992       | Graduate Teaching/Research Assistant, Physical Chemistry, University of Bonn, Germany   |  |  |  |
| Administrative an | Administrative and Leadership Positions   |  |  |  |
| 2016 – present    | Coordinator, General Chemistry Laboratory Education, Missouri S&T   |  |  |  |
| 2015              | Conference Organization & Fundraising, 2 <sup>nd</sup> Branson NMR Meeting (January 17-18, 2015)  |  |  |  |
| 2014 – 2016       | Executive Team Leader, General Chemistry Blended Laboratory Course Redesign, Missouri S&T   |  |  |  |
| 2014              | Conference Organization, 1st Branson NMR Meeting (February 22-23, 2014)   |  |  |  |
| 2014              | Conference Organization and Chairman, LEAD@S&T, Missouri S&T  |  |  |  |
| 2011 – 2013       | <i>Executive Team Leader</i> , Buffet-Model Course Redesign for general chemistry, National Center for Academic Transformation (NCAT) & Missouri Course Redesign Initiative |  |  |  |
| 2011 – 2012       | Participant, Leadership Development Program (LDP), University of Missouri System, Columbia, MO  |  |  |  |
| 2011              | Acting Director, Freshman Faculty Forum (FFF), Missouri S&T   |  |  |  |
| 2009 – present    | Director, Institute for Applied Chemistry and Nuclear Magnetic Resonance, Missouri S&T  |  |  |  |
| 2009 – present    | Division Head, Physical Chemistry, Missouri S&T   |  |  |  |
| 2006              | Symposium Organization, 16 <sup>th</sup> Annual Teaching Renewal Conference, University of Missouri, Columbia, MO   |  |  |  |
| 2005 – 2009       | Coordinator, General Chemistry Education, Missouri S&T  |  |  |  |
| 2005 – 2006       | Acting Director, New Faculty Teaching Scholarship (NFTS) program, University of Missouri System,<br>Columbia, MO  |  |  |  |
| 2001              | Symposium Organizer and Chairman, 21st Nordrhine-Westfalia Spring Symposium on Magnetic Resonance   |  |  |  |

(21. NRW-Frühjahrssymposium Magnetische Resonanz), University of Bonn, Germany.

# Highlights of Administrative and Leadership Accomplishments

#### Departmental Leadership:

Before my term as Department Chair of Chemistry, I served as Assistant Department Chair for student affairs. I also served as Associate Department Chair for curricular and academic affairs. I was able to provide leadership to...

- ... accommodate enrollment increases in laboratory courses, reassign existing space, and initiate renovations.
- ... engage donors in financial campaigns to increase departmental endowments.
- ... initiate fundraising to upgrade departmental instrumentation, complete an NMR teaching and research laboratory with utilization increases by several 100%.
- ... nominate and encourage nominations of students, staff, and faculty for internal and external awards. Under my leadership, chemistry became the most successful Missouri S&T department in securing University of Missouri System President's Awards. In addition, two chemistry students won S&T woman student of the year awards.
- ... conduct a departmental self-study to secure American Chemical Society (ACS) certification of chemistry B.S. degree programs. I proactively initiated curriculum changes to comply with new but not yet implemented ACS guidelines.
- ... developed a departmental strategic plan aligned with the strategic plan of the University of Missouri system.
- ... enhance the departmental seminar series by securing alumni endowments for travel and accommodation of outside speakers, and boost participation by dedicating a half hour before the seminar to social gathering.
- ... hire four new staff and faculty members, established a new departmental faculty line, and led two faculty to promotion.

### Academic Leadership Positions:

Leadership positions and committee assignments before and after the term as Department Chair include...

- ... Director of Freshman Faculty Forum and Campus Director of the University of Missouri system-wide New Faculty Teaching Scholarship (NFTS) program. These initiatives provide a mentoring forum for new faculty during their first few years on campus, offering a variety of programs and resources that support the transition to campus, the achievement of academic goals, and the enhancement of professional success.
- ... Director of Missouri S&T's Institute for Applied Nuclear Magnetic Resonance providing researchers access to modern Nuclear Magnetic Resonance (NMR) technology and instrumentation. The Institute facilitates a discussion forum for involved researchers and assists in the development of new NMR techniques for materials analysis.
- ... American Chemical Society (ACS) local-section officer positions as chair and treasurer. My creative teachereducation programs and services to the ACS were recognized in 2011 with the ACS Salute to Excellence Award.
- ... shared governance positions as a member of the Faculty Senate. Among other committees, I chaired the standing committee for facilities planning, initiating the development of a new campus master plan and establishing emergency preparedness procedures to counteract and mitigate threads of intruders or natural disasters.
- ... membership on the Chancellor's campus-wide Student Success Committee. Recognized for my expertise and as the longest-serving member of this committee, I am frequently consulted for advice toward undergraduate and graduate student personal and professional development as well as their academic success.
- ... long-term membership of the Missouri S&T Center for Educational Research and Teaching Innovation (CERTI). CERTI activities include faculty development seminars and panel discussions, educational technology initiatives and adoptions, scholarship of teaching and learning (SoTL) assistance, and faculty support geared toward teaching improvements and professional development.
- .. representing Missouri S&T on the Missouri Department of Higher Education (MDHE) Advisory Council for the statewide implementation of Missouri State Senate Bill 997 (Higher Education Core Curriculum Transfer Act). This bill guarantees the state-wide transferability of core general-education courses between all public two- and four-year institutions of higher education in Missouri.

### Academic Transformation Initiatives:

A focus of my academic career has been the exciting potential that can be found in transforming traditional teachercentered lecture instruction to an academic community of engaged teachers and active learners that better serves the needs of a diverse group of learners. Guided by this principle, I have initiated and led...

- ... the early introduction of student response devices (clicker) on campus. Only a few semesters after my pilot project, clickers were adopted campus-wide and became available in every Missouri S&T classroom.
- ... a redesign of the large-enrollment multi-section general chemistry course with technology-supported active-learning strategies. My team successfully implemented (long before COVID) a student-choice model where students select their own way of engaging with the course material: face-to-face, blended, or fully online. This redesign earned me the inaugural University of Missouri President's Award for Innovative Teaching in 2011.
- ... the restructuring of the general chemistry lab course by evolving it from an underfunded teaching lab to a blended course of authentic hands-on activities in the laboratory combined with hands-on activities in the commons.

# **Professional Societies**

Academy of the Society of American Military Engineers (SAME) American Chemical Society, Physical Chemistry Division Salute to Excellence Award "Continued Contribution to the American Chemical Society" (2011) Treasurer, South Central Missouri Local Section (2007 – 2012) Chairman, South Central Missouri Local Section (2006) German Chemical Society (Gesellschaft Deutscher Chemiker - GDCh). Magnetic Resonance Spectroscopy Division Honors & Awards Research: "Make a Difference" Award, Society of American Military Engineers (2014) Nobel Laureate Richard R. Ernst Award for "Best Subscribed Manuscript and Breakthrough in NMR Spectroscopy", German Chemical Society (GDCh) (2002) Visiting Scientist, Chemical Technology Division, Argonne National Laboratory (Summer Appointments 1995, 1997, 1998, 1999, 2001) R&D100 Award "Toroid Cavity Imager", R&D Magazine (1994) Outstanding Achievement Award, Argonne National Laboratory (1994) Geheimrat Dr. Edmund ter Meer Best PhD Thesis Award, University of Bonn, Germany (1992) Research Scholar "Spectroscopy with Isolated and Condensed Molecules", German National Research Foundation (DFG) (1991 - 1992)Graduate Fellowship, German National Konrad Adenauer Foundation (1989 – 1991) Heinrich Hörlein Memorial Best Chemistry Master's Thesis Award, University of Bonn, Germany (1989) Theodor Laymann Master's Fellowship, University of Bonn, Germany (1987 – 1988) Teaching: Campus Outstanding Teacher Award, Missouri S&T (2020) Campus Faculty Teaching Award, Missouri S&T (2010 inaugural year, 2017, 2020) Wilbur Tappmeyer Excellence in Teaching Undergraduates Award, Chemistry Department, Missouri S&T (2007, 2019) Excellence in Teaching Graduate-Level Courses, Chemistry Department, Missouri S&T (2009, 2014) State of Missouri Learning Commons Scholar (2013 inaugural year) University of Missouri System President's Award for Innovative Teaching (2011 inaugural year) "We love your class" Award, Freshman Engineering, Missouri S&T (2008, 2009) Faculty Teaching Scholar, Missouri S&T (2008) New Faculty Teaching Scholar, University of Missouri System (2004) Service: Faculty Service Award, Missouri S&T (2017) Outstanding Contribution to Service Award, Chemistry Department, Missouri S&T (2017) Media Presence and Outreach Labs don't stop for pandemics https://news.mst.edu/2021/03/labs-dont-stop-for-pandemics/ (published March 29, 2021). Livestreamed Chemistry Labs Keep Learning Real — Mistakes, Spills and All, Campus Technology, https://campustechnology.com/articles/2020/09/17/livestreamed-chemistry-labs-keep-learning-real-mistakes-spills-andall.aspx (published September 17, 2020) New chemistry online labs show teaching, learning success https://econnection.mst.edu/2020/09/new-chemistry-online-labs-

<u>show-teaching-learning-success/</u> (published September 1, 2020).
Missouri S&T Tackles Challenge of Science Lab Courses During Remote Learning, MeriTalk State and Local,

https://www.meritalkslg.com/articles/missouri-st-tackles-challenge-of-science-lab-courses-during-remote-learning/ (published August 31, **2020**)

How to livestream your lab – Woelk shares best practices <u>https://econnection.mst.edu/2020/03/how-to-livestream-your-lab-woelk-shares-best-practices/</u> (published March 26, **2020**).

- FYRE program advances freshman's STEM passion, Missouri S&T web portal cover story https://news.mst.edu/2018/10/fyreprogram-advances-freshmans-stem-passion/ (published October 23, **2018**).
- Affordable and Open Educational Resources, University of Missouri System, <u>https://www.youtube.com/watch?v=Ltl9oal5FPM</u> (published June 30, **2018**).

Faculty Experiences with A&OER (Affordable & Open Educational Resources), University of Missouri System (published December 7, 2017).

University of Missouri to Push Cheaper Textbook Plan, Columbia Tribune, Columbia, MO (published June 21, 2017).

- Blended Chemistry Lab at Missouri S&T, <u>https://www.youtube.com/watch?v=NHTeXINX6Lk</u>, Missouri S&T (published February 1, **2016**).
- Science Meets Edtech Science instructors speak about the new technology they've used in their classroom, <u>https://www.kaltura.com/tiny/9jm7q</u>, Missouri S&T (published April 30, **2015**).
- University of Missouri System eLearning Report, <u>https://www.youtube.com/watch?v=XpyKz2U12FI</u> (published February 9, **2015**).
- What I Really Learned In Chem 1, Editorial: The Missouri Miner, Missouri S&T (published October 9, 2014).
- Plugging In to STEM Technology is taking center stage in STEM education, offering real-world training options and engaging today's tech-savvy students, <u>https://webcpm.com/Articles/2014/03/01/STEM.aspx?Page=1</u>, College Planning & Management and <u>https://spaces4learning.com/articles/2014/03/01/stem.aspx</u>, Spaces4Learning, (published March 1, **2014**).
- Higher Education: Statewide Course Redesign Initiative Improves Learning Outcomes, Rolla Daily News, Rolla, MO (published August 21, 2013).
- Missouri Course Redesign Initiative, The National Center for Academic Transformation (NCAT),
- http://www.thencat.org/States/MO/Abstracts/MUST%20Chemistry\_Abstract.html (published march 3, 2013).
- On the Road with Course Redesign, Missouri S&T Center for Educational Research and Teaching Innovation (CERTI) Newsletter, Vol. 4(1), Spring **2013**.
- The Surprising Uses of PowerPoint to Increase Student Engagement, <u>https://www.youtube.com/watch?v=Op5BdKqNbr0</u>, (published February 21, **2012**)
- Why Redesign at Missouri S&T? <u>http://classes.mst.edu/chem1310</u>, Course-redesign webpage (published April **2012**) with links to videos:
  - Intro to Chemistry: Buffet Options, https://www.youtube.com/watch?v=vMSJz9Zn-18
  - Intro to Chemistry: Face-to-Face Lecture, https://www.youtube.com/watch?v=ITkF7R8SYml
  - Intro to Chemistry: Face-to-Face Recitation, <u>https://www.youtube.com/watch?v=TEho6udft7c</u>
  - Intro to Chemistry: Online Lecture, https://www.youtube.com/watch?v=5T8VLWowuel
  - Intro to Chemistry: LEAD, https://www.youtube.com/watch?v=rk58yUdUfDE
- Chem 1 Goes to Buffet Model, Missouri S&T Center for Educational Research and Teaching Innovation (CERTI) Newsletter, Vol. 2(3), <u>http://scholarsmine.mst.edu/cafe\_newsletters/9/</u>, Winter **2011**.
- Chem Professor Encourages His Students to Do What?, Missouri S&T Center for Educational Research and Teaching Innovation (CERTI) Newsletter, Vol. 1(3), <u>http://scholarsmine.mst.edu/cafe\_newsletters/6/</u>, Winter **2010**.

### **Service Activities**

### Missouri Department of Higher Education:

2016 – 2019 Common Curriculum Advisory Council (CCAC) for the Implementation of Missouri Senate Bill 997 (Higher Education Core Curriculum Transfer Act)

# University of Missouri System:

| 2020 - present                  | Task Force Member, Course Collaboration and Share   |  |  |  |
|---------------------------------|---|--|--|--|
| 2018 – present                  | Faculty Technical Group Member, eLearning   |  |  |  |
| 2018                            | Review Committee, Online and Distance Learning Education Programs   |  |  |  |
| 2017 – present                  | Task Force Member, President's Initiative "Affordable and Open Educational Resources"<br>Executive Committee & Subcommittees: "Awareness, Promotion & Training", "Grant Program Design &<br>Implementation", "Metrics and Evaluation" |  |  |  |
| 2017                            | Advisory Council, President's Initiative "Accelerated Degrees/Dual Credit"  |  |  |  |
| 2012 – 2013                     | University of Missouri President's Strategic Planning Coalition<br>Subcommittee "Undergraduate Students"  |  |  |  |
| 2011 – 2013                     | Presidential Awards Advisory Committee<br>Subcommittees "Innovative Teaching". "Intercampus Collaboration"  |  |  |  |
| 2005 - 2006                     | Acting Co-Director, four-campus New Faculty Teaching Scholars Program   |  |  |  |
| 2004 – 2007                     | Proposal Review, Missouri Research Board  |  |  |  |
| <u>Missouri S&amp;T Campus:</u> |   |  |  |  |
| 2022 – present                  | Chancellor-Appointed Faculty Member, Equity & Title IX Hearing Panel  |  |  |  |
| 2022 – present                  | Chancellor-Appointed Faculty Member, Academic Misconduct Hearing Panel  |  |  |  |
| 2021 – present                  | Chancellor-Appointed Faculty Member. Student Conduct Hearing Panel  |  |  |  |
| 2020                            | Provost-Appointed Faculty Member, Grade Appeal Committee  |  |  |  |
| 2019 - present                  | Chemistry Course Review, Missouri Senate Bill 997 (Higher Education Core Curriculum Transfer Act)   |  |  |  |
| 2018 – 2020                     | Advisory Committee, Center for Advancing Faculty Excellence (CAFE)  |  |  |  |
|                                 | Subarmittage "Professional Development"   |  |  |  |

Subcommittee: "Professional Development"

| 2018 – 2019                   | Provost-Appointed Faculty Advisory Council, Global Education  |
|-------------------------------|---|
| 2016<br>2017 – present        | Advisory Committee, Faculty Service Award<br>Advisory Committee, Fast Central College Concurrent Enrollment Program |
| 2016 – 2020                   | Faculty Senate  |
|                               | Standing Committees "Library and Learning Resources", "Student Affairs"   |
| 2015 – 2018                   | Discipline-Specific Curriculum Committee (DSCC), Sciences   |
| 2015 – present                | Advisor, Second Bachelor's Degree in Chemistry  |
| 2014 - 2015                   | Scholarship Advisory Board  |
| 2013 - 2013                   | Selection Committee Honorary Degree   |
| 2010                          | Ad-hoc Committee "Honorary Degree Selection Process"  |
| 2012 – present                | Chancellor's Student Success Committee  |
|                               | Subcommittees "Mathematics", "Student Success Course", "Freshman Online Classes", "Graduate                         |
|                               | Student Experience", "Transfer Student Success", "International Students"   |
| 2011 – 2014                   | Department-Chair Committee  |
| 2010 2011                     | Ad-noc Subcommittees "Academic Alerts", "Exit Interview Process", "Massive Open Unline Courses"                     |
| 2010 - 2011<br>2009 - 2012    | Crisis Communication Team   |
| 2008 – 2012                   | Review Committee, Chancellor's Emergency Action Plan  |
| 2008 – 2009                   | Ad-hoc Committee, Faculty-Award Restructuring   |
|                               | Subcommittee "Faculty Teaching Award"   |
| 2008                          | Presenter, Panel-of-Peers Academic Infrastructure Enhancement   |
| 2007 – 2018                   | Advisory Board, Center for Educational Research and Teaching Innovation (CERTI)                                     |
| 2007 - 2009                   | Chancellor's Tuition and Residency Committee  |
| 2000 - present<br>2005 - 2009 | Faculty Senate  |
| 2000 2000                     | Standing Committees "Facilities Planning" (Chair), "Rules, Procedure & Agenda"                                      |
|                               | Ad-hoc Committees "Bylaws Revision", "Missouri Senate Bill 389 Compliance"  |
| 2005 – 2006                   | Student Academic Affairs Committee, College of Arts & Sciences,   |
| 2005                          | Organization & Coordination, Freshman Faculty Orientation and Welcome   |
| 2004 – 2005                   | Agenda & Nominating Committee, College of Arts & Sciences,  |
| 2004                          | International Graduate Student Advisor  |
| Chemistry Depa                | rtment (Chair or Member):   |
| 2022 – 2024                   | Personnel Committee   |
| 2017 – present                | Undergraduate Attairs/Recruiting Committee  |
| 2017                          | Graduate Recruiting Committee   |
| 2010 - 2011                   | Graduate Affairs Committee  |
| 2009 – 2010                   | Personnel Committee   |
| 2007 – 2009                   | GTA Assessment Workshop   |
| 2007 – 2008                   | New-Funds Committee   |
| 2007 – 2008                   | Graduate Affairs Committee  |
| 2006 - 2010                   | Scholarship Committee   |
| 2004 - present<br>2004 - 2010 | Faculty & Stall Search Committees   |
| 2004 - 2016                   | Personnel Committee   |
| 2004 – 2005                   | Graduate Affairs Committee  |
| Other Academic                | and Professional Activities:  |
| 2022                          | CAREER Proposal Review Panel, National Science Foundation   |
| 2021 – 2022                   | External Review Panel, Chemistry Program & Curriculum, East Central College, Union MO                               |
| 2009                          | Proposal Review Panel, National Science Foundation  |
| 2008 – 2016                   | Faculty Advisor, MasteringChemistry® Online Homework Platform, Pearson Education                                    |
| 2008                          | Adjunct Faculty, East Central College   |
| 2004 – 2015                   | General & Physical Chemistry Textbook Review  |
| 2002 2007                     | (McGraw-Hill, Benjamin Cummings, Freeman, Pearson, Wiley)   |
| 2002 - 2001                   | ounsultant, European ounnission nesearch Action Pressure running of Oatalytical Processes                           |

- 2002 Lead Instructor, Summer Academy "Modern Imaging in Medicine and Technology", German National Academic Scholarship Foundation (Studienstiftung des Deutschen Volkes), Rot an der Rot, Germany
- 1999 2002 Public Relations Initiative for recruiting high-school students into STEM disciplines, College of Mathematics and Natural Sciences, University of Bonn, Germany
- 1996
   Lead Instructor, Summer Academy "High Tech High Chem High Precision", German National Academic

   Scholarship Foundation (Studienstiftung des Deutschen Volkes), Valdora, Italy.
- 1995 present Journal Article Review (J. Chem. Educ., J. Magn. Reson, JACS, PCCP, Top. Curr. Chem., Adv. Synth. Catal., J. Incl. Phenom. Macro.)

# Representative Outreach and Community Activities:

- Peoples Education and Experiential Learning: Introducing Mendelian genetics to middle-school students; explaining NMR spectroscopy to American Chemical Society (ACS) Student Groups; presenting new teaching and learning technologies to State of Missouri Chamber of Commerce and Industry members (Leadership Missouri); hosting middle-school, high-school, and community college laboratory visits; organizing ACS sponsored teacher education workshops; judging middle-school science fair contributions
- Missouri S&T or University of Missouri System Representation: speaking at press conference about Open Educational Resources; visiting University of the Western Cape, Bellville, Republic of South Africa as part of a delegation to commemorate 30 years of partnership with University of Missouri System; visiting Sondershausen in Germany as part of the Rolla Sister City delegation
- New Initiatives: Coordinating and supervising photoshoot of re-enacted chemical accidents for use during chemical laboratory safety instruction; organizing New Faculty Teaching Scholarship (NFTS) Alumni Event; founding the Ethics and Morality Institute at the Catholic Newman Center for strengthening personal and professional integrity of students

# Courses Taught

Courses taught include lectures and lab instructions in general, physical, and analytical chemistry. Enrollment numbers varied from 20 to 70 students in sophomore- and junior-level physical-chemistry courses to about 450 in general-chemistry lectures for majors and non-majors. Typical enrollment in graduate-level courses was between 5 and 15 students. Average student evaluation: 3.5 out of 4.0 (Missouri S&T: 3.2, Chemistry Department: 2.8)

### Undergraduate Courses (Grundstudium), University of Bonn:

Physical Chemistry I-IV (Structure of Matter, Thermodynamics, Kinetics, Spectroscopy); Physical Chemistry I (Structure of Matter) for secondary-education majors; Modern Methods in Physical Chemistry; Instrumental Analysis

### Graduate Courses (Hauptstudium), University of Bonn:

The Physics of Modern Spectroscopic Methods in Chemistry; Modern Methods of NMR Spectroscopy and Imaging + Lab; Advanced Instrumental Analysis + Lab; Advanced Physical Chemistry Lab; Principles of Catalysis

### Undergraduate Courses, Missouri S&T:

Orientation for Chemistry Majors; Introduction to Laboratory Safety and Hazardous Materials; General Chemistry I; General Chemistry Laboratory; Chemical Thermodynamics; Practical Aspects of Nuclear Magnetic Resonance

# Graduate Courses, Missouri S&T

Advanced Chemical Thermodynamics; Chemical Spectroscopy; Quantum Chemistry; Advanced NMR Spectroscopy

### Advisement and Mentorship (beyond degree-program advisement of undergraduates)

| Visiting Scientists:        | Argonne National Laboratory (2)   |
|-----------------------------|---|
| Postdoctoral Trainee:       | University of Amsterdam, The Netherlands (1)  |
| Ph.D. Students:             | Theses in NMR Spectroscopy and Imaging (10), Chemical Catalysis (3), Chemical Education (2), Drug Delivery (1)  |
| Master's Students:          | Theses in NMR Spectroscopy and Imaging (4); Non-Thesis (5)  |
| Visiting Graduate Students: | The University of Queensland, Australia (1), Technical University Munich, Germany (1)   |
| Graduate Committees:        | Departments: Chemistry (26), Geosciences (3), Physics (1), Material Sciences (1),<br>Electrical Engineering (1), Nuclear Engineering (1)  |
| Undergraduate Students:     | Research Honor's thesis (1); OURE (Opportunity for Undergraduate Research<br>Experience, <u>https://undergrad.mst.edu/experientiallearning/oure/</u> ) in Chemistry (15),<br>Chemical and Biological Engineering (5), Biological Sciences (2), Physics (1),<br>Mechanical Engineering (1), Architectural Engineering (1), English and Technical |

|                         | Communications (1); OURE Fellowship in Architectural Engineering (1); FYRE (First                             |
|-------------------------|---|
|                         | Year Research Experience, https://case.mst.edu/research/fyre/) in Chemistry (4),                              |
|                         | Physics (1); Summer Research Scholarship in Chemistry (4); Summer Research                                    |
|                         | Internship in Chemistry (3); Research for Credit (14); Research Co-op for Credit (3); Research Volunteers (9) |
| High-School Students:   | Summer Research Internship in Chemistry (5); Science Paper and Project Support (1)                            |
| Middle-School Students: | Science Olympiad Project Support (3)  |

# Funded Projects as Principle Investigator: \$1.2 M+ (% grant credit shown in parentheses)

# Scholarly Research at Missouri S&T:

- M. Fitch, K. Woelk, Lignocellulosic Determination for a Biochemical Reactor Treating Mine Impacted Water, Alloy Group, \$8,800 (12%), 03/14/2022 09/01/2022.
- J. Huang, K. Woelk, OBI: Acquisition of Preliminary Data to Support NIH Resubmission Proposal for Turbo Mohs with Novel Acupuncture-MRI Probe, \$12,500 (40%), 04/01/2018 03/31/2019.
- K. Woelk, High-resolution NMR Relaxometry for the Characterization of Fluid Flow in Porous Materials, Materials Research Foundation, \$5,000 (100%), 01/01/2018 12/31/2019.
- K. Woelk, Molecular Hydrocarbon and Water Adsorption on Clay Minerals and Solid Organic Matter, Argonne Nat'l Lab, Chevron Corporation, \$164,077 (100%), 06/15/2013 – 09/30/2015.
- K. Woelk, Collaborative Research: Revolutionary New Capabilities for EPR and Toroid NMR, NSF (CHE 0943442), \$73,393 (100%), 09/01/2009 08/31/2011.
- K. Woelk, Mechanistic Study of the Hydrothermal Degradation of Glucose, Missouri Research Board, \$17,000 (100%), 07/01/2009 12/31/2010.
- K. Woelk, Conversion of Biomass to Fuel (BTF) Through Hydrothermal Degradation, Missouri S&T Energy Research & Development Center, \$43,000 (100%), 05/01/2009 08/31/2012.
- K. Woelk, Quantitative <sup>29</sup>Si-NMR Studies to Determine the Process-Dependent Formation of Linear and Branched Silicones, Brewer Science, \$23,750.20 (100%), 01/01/2008 – 05/15/2009.
- N. Leventis, K. Woelk, C. Sotiriou-Leventis, Collaborative Research: Synthesis, Characterization, Modelling and Simulation of Polymer Nanoencapsulated Aerogels, NSF (CMMI 0653919), \$154,970 (15%), 06/01/2007 05/31/2010.

### Major Equipment (Institute of Applied Nuclear Magnetic Resonance):

- K. Woelk, Benchtop NMR Spectrometer to Meet American Chemical Society (ACS) Requirements for Certification of Chemistry Bachelor of Science Degree Programs, Magritek Inc., San Diego, CA, Missouri S&T College of Arts, Sciences and Business, Institute for Applied Nuclear Magnetic Resonance, \$93,859 (100%), 03/24/2014 – 09/30/2015.
- K. Woelk, Enhancing Instructional Laboratory for Nuclear Magnetic Resonance Spectroscopy, External Fundraising, Missouri S&T Unified Strategic Plan, \$187,000 (100%), 01/24/2014 – 12/31/2014.

# Scholarship of Teaching and Learning:

- J. P. Hogan, K. Woelk, Evaluating the Impact of 3D-Virtual Representations in Achieving Object-Based Learning Outcomes Across Diverse Learning Environments, Missouri S&T Provost's eFellows Program, Missouri S&T Department of Geosciences and Geological and Petroleum Engineering, Missouri S&T Department of Chemistry, \$9574.95 (50%), 08/01/2020 – 05/31/2021.
- K. Woelk, UM System Affordable & Open Educational Resources (A&OER) initiative award to convert CHEM 3410 (Chemical Thermodynamics) to OER, \$11,000 (100%), 05/01/2018 04/30/2019
- K. Woelk, S. B. Burchett, Analysis of Student Success in a Blended Laboratory Course by Trend Analysis in a Parallel Lecture Course, Missouri S&T Educational Research Grant, \$4,050 (100%), 08/01/2015 12/31/2016.
- K. Woelk, CHEM 1319 Lab Redesign Full Implementation, Missouri S&T & The Missouri Learning Commons, \$65,000 (100%), 07/01/2015 05/31/2016.
- K. Woelk, S. B. Burchett, Optimizing Institution Resources by Introducing a Blended Component in Chem 2, Missouri S&T Provost's eFellows Program, Missouri S&T Chemistry Department, \$10,000 (100%), 08/01/2014 05/31/2016.
- K. Woelk, Missouri Learning Commons Scholar Support, Next Generation Learning Challenge Grant, Missouri Department of Higher Education, \$3,200 (100%), 01/01/2013 12/31/2016.
- K. Woelk, General Chemistry I (Chem 1) Buffet-Model Whole-Course Redesign, Missouri S&T Provost Office, \$41,500 (100%), 08/01/2011 – 04/03/2013.
- K. Woelk, Faculty Teaching Scholar Support, Missouri S&T Office for Undergraduate and Graduate Studies, \$3,000 (100%), 05/01/2006.
- K. Woelk, New Faculty Teaching Scholarship (NFTS) program, University of Missouri System, \$17,000 (100%), 08/01/2005 05/31/2006.

# Peer-Reviewed Journal Articles (50+)

# Scholarly Research:

- N. T. Moon, K. Woelk, G. S. Grubbs II, Construction and Demonstration of a 6–18 GHz Microwave Three-Wave Mixing Experiment Using Multiple Synchronized Arbitrary Waveform Generators, *Symmetry* 2022, *14*, 848.
   *Featured Article and Symmetry Journal Cover Art*
- A. Priester, R. Waters, A. Abbott, K. Hilmas, K. Woelk, H. A. Miller, A. W. Tarudji, C. C. Gee, B. McDonald, F. M. Kievit, A. J. Convertine, Theranostic Copolymers Neutralize Reactive Oxygen Species and Lipid Peroxidation Products for the Combined Treatment of Traumatic Brain Injury, *Biomacromolecules* **2022**, 23, 1703–1712.
- M. Huang, S. Chen, J. Huang, R. E. Gerald II, K. Woelk, NMR Studies of Materials Loaded into Porous-Wall Hollow Glass Microspheres, *Mater. Sci. Eng. C* 2020, *116*, 111177.
- L. Chi, M. Huang, A. R. Pfaff, J. Huang, R. E. Gerald II, K. Woelk, Capillary-tube package devices for the quantitative performance evaluation of nuclear magnetic resonance spectrometers and pulse sequences, *Rev. Sci. Instrum.* **2018**, *89*, 123115.
- A. R. Pfaff, K. Woelk, A Fast and Convenient Way to Predict Relaxation during a Frequency-selective Adiabatic Hyperbolic Secant Pulse (HS1 Sech Pulse), *Appl. Magn. Reson.* **2018**, *49*, 479-491.
- A. R. Pfaff, C. McKee, K. Woelk, Predicting the Effect of Relaxation during Frequency-selective Adiabatic Pulses, *J. Magn. Reson.* **2017**, 284, 99–103.
- A. J. Mundahl, S. P. Berg, J. L. Rovey, M. Huang, K. Woelk, D. V. Wagle, G. Baker, Characterization of a Novel Ionic Liquid Monopropellant for Multi-Mode Propulsion, *AIAA Propulsion and Energy Forum*, (*AIAA* **2017**-4756).
- E. T. Satterfield, A. R. Pfaff, W. Zhang, L. Chi, R. E. Gerald II, K. Woelk, Exponentially Converging Eradication Pulse Train (EXCEPT) for Solvent-Signal Suppression in Investigations with Variable *T*<sub>1</sub> Relaxation Times, *J. Magn. Reson.* **2016**, 268, 68–72.
- T. E. Skinner, M. Braun, K. Woelk, N. I. Gershenzon, S. J. Glaser, Design and Application of Robust RF Pulses for Toroid Cavity NMR Spectroscopy, *J. Magn. Reson.* **2011**, *209*, 282-290.
- H. G. Niessen, K. Woelk, Investigations in Supercritical Fluids, in "In situ NMR Methods in Catalysis", J. Bargon, L. Kuhn (eds.), *Topics Curr. Chem.* 2007, 276, 69-110.
- T. Jonischkeit, U. Bommerich, J. Stadler, K. Woelk, H. G. Niessen, J. Bargon, Generating Long-Lasting <sup>1</sup>H- and <sup>13</sup>C Hyperpolarization in Small Molecules with Parahydrogen-Induced Polarization, *J. Chem Phys.* **2006**, *124*, 201109 (1-5).
- A. M. Kluwer, T. S. Koblenz, T. Jonischkeit, K. Woelk, C. J. Elsevier, Kinetic and Spectroscopic Study of the [Palladium(Arbian)]-Catalyzed Semi-Hydrogenation of 4-Octyne, J. Am. Chem. Soc. 2005, 127, 15470-15480.
- T. Jonischkeit, K. Woelk, Hydrogen Induced Polarization Nuclear-Spin Hyperpolarization in Catalytic Hydrogenations without the Enrichment of Para- or Orthohydrogen, *Adv. Synth. Catal.* **2004**, *346*, 960-969.
- J. Bargon, B. Graewe, Th. Jonischkeit, K. Woelk, Sensorik Von der Waage zur elektronischen Nase, *Chem. Unserer Zeit* **2003**, 37, 212-213.
- H. G. Niessen, P. Trautner, R. Backhausen, K. Woelk, Recent Developments in Toroid Cavity Engineering, *Concepts Magn. Reson. Part B (Magn. Reson. Eng.)* 2003, 16B, 15-21.
- K. Woelk, P. Trautner, H. G. Niessen, R. E. Gerald II, RIDE'n RIPT Ring-Down Elimination in Rapid Imaging Pulse Trains, J. Magn. Reson. 2002, 159, 207-212.
- P. Trautner, K. Woelk, Improved Strategies for NMR Diffusion Measurements with Magnetization-Grating Rotating-Frame Imaging (MAGROFI), *Phys. Chem. Chem. Phys.* **2002**, *4*, 5973-5981.
- P. Trautner, K. Woelk, Fast Chemical-Shift *T*<sub>1</sub> Imaging in Toroid Cavities for the Structural Analysis of Gels and Emulsions, *Appl. Magn. Reson.* **2002**, 22, 291-305.
- H. G. Niessen, A. Eichhorn, K. Woelk, J. Bargon, Homogeneous Hydrogenation in Supercritical Fluids Mediated by Colloidal Catalysts, *J. Mol. Catal. A* **2002**, *182/183*, 463-470.
- H. G. Niessen, P. Trautner, S. Wiemann, J. Bargon, K. Woelk, The Toroid Cavity Autoclave for High-Pressure and Variable-Temperature in situ Nuclear Magnetic Resonance Studies, *Rev. Sci. Instrum.* **2002**, 73, 1259-1266.
  - Richard R. Ernst Award 2002: "Best Subscribed Manuscript" (Division of Magnetic Resonance Spectroscopy, German Chemical Society)
- P. Trautner, K. Woelk, J. Bargon, R. E. Gerald II, Angular Flow in Toroid Cavity Probes, J. Magn. Reson. 2001, 151, 284-290. — J. Magn. Reson. Cover Art
- K. Woelk, Torus Factor The Relationship between Radiofrequency Field and Radial Position in Toroid Cavity Probes, J. Magn. Reson. 2000, 146, 157-164.
- K. Woelk, B. L. J. Zwank, P. Trautner, E. Lehnhof, J. Bargon, R. J. Klingler, R. E. Gerald II, J. W. Rathke, Finite-Difference Approach for the High-Precision Analysis of Rotating-Frame Diffusion Images, *J. Magn. Reson.* **2000**, *145*, 276-290.
  - J. Magn. Reson. Cover Art

- S. Lange, A. Brinkmann, P. Trautner, K. Woelk, J. Bargon, W. Leitner, Mechanistic Aspects of Dihydrogen Activation and Transfer During Asymmetric Hydrogenation in Supercritical Carbon Dioxide, *Chirality* **2000**, 12, 450-457.
- J. W. Rathke, R. J. Klingler, R. E. Gerald II, D. E. Fremgen, K. Woelk, S. Gaemers, C. J. Elsevier, NMR Spectroscopy, Chap. 3.2 in "Chemical Synthesis using Supercritical Fluids", P. G. Jessop, W. Leitner (eds.), **1999**, 165-194, Wiley-VCH, Weinheim.
- K. Woelk, B. L. J. Zwank, J. Bargon, R. J. Klingler, R. E. Gerald II, J. W. Rathke, Imaging Diffusion with Non-Uniform B<sub>1</sub> Gradients, in "Spatially Resolved Magnetic Resonance", P. Blümler, B. Blümler, R. Botto, E. Fukushima (eds.), **1998**, 103-110, Wiley-VCH, Weinheim.
- R. E. Gerald II, R. J. Klingler, J. W. Rathke, G. Sandí, K. Woelk, In situ Imaging of Charge Carriers in an Electrochemical Cell, in "Spatially Resolved Magnetic Resonance", P. Blümler, B. Blümich, R. Botto, E. Fukushima (eds.), **1998**, 111 119, Wiley-VCH, Weinheim.
- K. Woelk, R. J. Klingler, J. W. Rathke, Nuclear Resonance Tomography with a Toroid Cavity Detector, *Magn. Reson. Imag.* **1997**, *15*, XVIII.
- J. W. Rathke, R. J. Klingler, R. E. Gerald II, K. W. Kramarz, K. Woelk, Toroids in NMR Spectroscopy, *Progr. NMR Spectrosc.* **1997**, *30*, 209-253.
- K. Woelk, R. E. Gerald II, R. J. Klingler, J. W. Rathke, Imaging Diffusion in Toroid Cavity Probes, *J. Magn. Reson. A* **1996**, 121, 74-77.
- A. Harthun, K. Woelk, J. Bargon, A. Weigt, Homogeneous Hydrogenation of Norbornadiene with Parahydrogen and Phosphonic Ester Phosphine Rhodium Complexes Studied by in situ NMR Spectroscopy, *Tetrahedron* **1995**, 51, 11199-11206.
- R. J. Klingler, J. W. Rathke, K. Woelk, K. W. Kramarz, R. E. Gerald II, Applications of Toroids in High-Pressure NMR Spectroscopy, *Am. Chem. Soc. Div. Fuel Chem. Preprints* **1995**, *40*, 415-419.
- K. Woelk, J. W. Rathke, Composite 90° and 180° Pulses to Compensate for Radiofrequency Gradients in Toroid NMR Detectors, *J. Magn. Reson. A* **1995**, *115*, 106-115.
- J. W. Rathke, K. Woelk, R. J. Klingler, Argonne's Toroid Cavity Imager Expands on MRI, J. Minerals, Metals and Materials Society (JOM) Oct. 1994, 7.
- J. W. Rathke, K. Woelk, R. J. Klingler, NMR Spectra Analyzed For Material Studies, in "The World's Most Brilliant Inventions", Research and Development (32nd Annual R&D 100 Awards) **1994**, 5.
- K. Woelk, J. W. Rathke, R. J. Klingler, The Toroid Cavity NMR Detector, J. Magn. Reson. A 1994, 109, 137-146.
- J. W. Rathke, R. J. Klingler, M. J. Chen, K. Woelk, High Pressure NMR Studies of Homogeneous Catalytic Processes, *Trends Organomet. Chem.* **1994**, *1*, 117-130.
- J. W. Rathke, R. J. Klingler, M. J. Chen, K. Woelk, Recent High-Pressure, NMR Spectral and Imaging Studies, *Proc. Ninth* DOE/BES Heterog. Catal. & Surf. Chem. Res. Conf., Oconomowoc, WI, (May 24 27, **1994**), 124-127.
- K. Woelk, J. Bargon, NMR Studies of the Kinetics of Homogeneously Catalyzed Hydrogenations Using Parahydrogen Induced Polarization at Variable Pressure, *Z. Phys. Chem.* **1993**, *182*, 155-165.
- J. Bargon, J. Kandels, K. Woelk, Ortho- and Parahydrogen Induced Nuclear Spin Polarization, Z. Phys. Chem. **1993**, 180, 65-93.
- K. Woelk, J. W. Rathke, R. J. Klingler, Rotating Frame NMR Microscopy Using Toroid Cavity Detectors, *J. Magn. Reson. A* **1993**, *105*, 113-116.
- K. Woelk, J. Bargon, High-Pressure NMR Probes for the in situ Investigation of Gas/Liquid Reactions, *Rev. Sci. Instrum.* **1992**, 63, 3307-3310.
- J. Bargon, J. Kandels, P. Kating, A. Thomas, K. Woelk, NMR Detection of Intermediates During Homogeneous Hydrogenation of Dienes Using Parahydrogen, *Tetrahedron Letters* **1990**, *31*, 5721-5724.
- J. Bargon, J. Kandels, K. Woelk, NMR Study of Nuclear Spin Polarization during Chemical Reactions with Ortho Hydrogen, Angew. Chem. Int. Ed. Engl. **1990**, 29, 58-59.

# Scholarchip of Teaching and Learning:

- K. Woelk, P. D. Whitefield, As close as it might get to the real lab experience Live-streamed laboratory activities, *in* "Insights Gained While Teaching Chemistry in the Time of COVID-19" (Special Issue), *J. Chem. Educ.* **2020**, 97, 2996-3001.
- T. R. McDowell, E. T. Schmittzehe, A. J. Duerden, D. Cernusca, H. Collier, K. Woelk, A Student-Choice Model to Address Diverse Needs and Promote Active Learning, *J. Sci. Educ. Technol.* **2019**, *28*, 321-328.
- S. B. Burchett, A. R. Pfaff, J. L. Hayes, K. Woelk, Exploding Misconceptions: Developing a Culture of Safety through Learner Driven Activity, *J. Chem. Health Saf.* **2017**, *24*, 36-42.
- T. R. McDowell, E. T. Satterfield, K. Woelk, H. Collier, Fostering a Positive Collaborative Learning Experience in an Optional Student Success Program, *J. Mod. Educ. Rev.* **2016**, *6*, 561–567.
- S. B. Burchett, J. L. Hayes, A. R. Pfaff, E. T. Satterfield, A. Skyles, K. Woelk, Piloting Blended Strategies to Resolve Laboratory Capacity Issues in a First-Semester General Chemistry Course, *J. Chem. Educ.* **2016**, 93, 1217–1222.
- K. Woelk, How heavy are you? Find the Answer in the Periodic Table, J. Chem. Educ. 2015, 92, 1757-1758.

- K. Woelk, E.T. Satterfield, Course Redesign Introduces Flexibility and Increases Student Success, http://www.pearsonmylabandmastering.com/northamerica/results/files/MC\_MO\_of\_U(2).pdf, published online at MasteringChemistry.com (12/27/2013) 56-57, Pearson Education 2013.
- K. Woelk, E. T. Satterfield, D. Cernusca, Case Study: Students Rate MasteringChemistry<sup>®</sup> as Most Valuable Assistive Instructional Tool, *Make Learning Part of the Grade*, Vol.2, 19-21, Pearson Education **2012**.
- K. Woelk, Matching Element Symbols with State Abbreviations A Fun Activity for Browsing the Periodic Table of Chemical Elements, *J. Chem. Educ.* **2009**, *86*, 1205-1207.
- K. Woelk, Optimizing the Use of Personal Response Devices (Clickers) in Large-Enrollment Introductory Courses, *J. Chem. Educ.* **2008**, *35*, 1400-1405.

### Patents (7)

- M. Huang, L. Chi, R. E. Gerald II, J. Huang, A. R. Pfaff, K. Woelk, In situ NMR Parameter Monitoring Systems and Methods for Measuring pH and Temperature, US Patent 10,295,487 (issued May 21, **2019**).
- L. Chi, M. Huang, R. E. Gerald II, K. Woelk, Solid State NMR Spectroscopy/Imaging in situ Measuring Devices and Methods for Calibration and Determining one or more Quantitative Properties of a Target Sample, US Patent 10,067,079 (issued September 4, **2018**).
- D. A. Summers, K. Woelk, K. D. Oglesby, G. Galecki, Method and Apparatus for Jet-Assisted Drilling or Cutting, US Patent 8.475.230 (issued July 2, **2013**).
  - licensed to Impact Technologies, Rochester, NY (2012 2016)
- H. G. Niessen, K. Woelk, A. Eichhorn, J. Bargon, Colloid-Catalyzed Gas Transfer in Supercritical Phases, European Patent EP 1404725 B1 (issued November 18, 2005) & US Patent 7,193,120 (issued March 20, 2007).
    *licensed to BASF Corporation, Ludwigshafen, Germany*
- J. W. Rathke, R. J. Klingler, K. Woelk, R. E. Gerald II, Near Electrode Imager, US Patent 6,046,592 (issued April 4, 2000).
- K. Woelk, J. W. Rathke, R. J. Klingler, Nuclear Resonance Tomography with a Toroid Cavity Detector, US Patent 5,574,370 (issued November 12, **1996**).

# **Conference Poster Presentations** (75+ while at Missouri S&T)

### Scholarly Research:

- R. M. Herndon, Z. G. Mayes, M. Abdelrahman, K. Woelk, Characterization of Pyrolysis Oils for Asphalt Fortification, Graduate Women in Science, 2022 Annual National Conference, Madison, WI (June 25, 2022).
- C. R. Murray, R. M. Herndon, Z. G. Mayes, M. Abdelrahman, K. Woelk, Characterization of Pyrolysis Oils for Asphalt Fortification, 2022 Missouri Academy of Science Annual Meeting, Fayette, MO (April 23, **2022**).
- A. Q. Hermelink, H. M. Bahn, Z. G. Mayes, K. Woelk, Investigating Industrial Methanol Production with Nuclear Magnetic Resonance Relaxometry, 2022 Missouri Academy of Science Annual Meeting, Fayette, MO (April 23, **2022**).
- G. A. Riddle, Z. G. Mayes, K. Woelk, The Influence of Dissolved Metal Ions on Nuclear Magnetic Relaxation Times in Aqueous Solutions, 2022 Missouri Academy of Science Annual Meeting, Fayette, MO (April 23, **2022**).
- M. R. Sly, L. M. Kehoe, B. Salunkhe, T. P. Schuman, K. Woelk, Chemical-shift-resolved high-resolution NMR relaxometry of polymer hydrogels, ACS Midwest Regional Meeting (MWRM2021), Springfield MO (October 20-22, 2021).
- M. Parker, L. J. Albrecht, M. Huang, J. Huang, R. E. Gerald II, K, Woelk, Low-Cost Solution for Optically Induced NMR Hyperpolarization, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 16, **2019**).
- K. E. Brakensiek, K. Woelk, Relaxation of Hyperpolarized Nuclear Magnetic Resonance (NMR) Spin States, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 7-8, **2019**).
- M. Huang, M. Parker, K. Woelk, J. Huang, R. E. Gerald II, Simple Laser System for Hyperpolarized NMR Experiments, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 7-8, **2019**).
- K. Woelk, Revisiting the Longitudinal Relaxation of Hyperpolarized Nuclear Spin States, 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 May 4, **2018**).
- M. Huang, K. M. Lee, K. Woelk, NMR pH Measurements using the <sup>19</sup>F Chemical Shift of Fluoro-hydroxymethylpyridines With and Without Deuterium Field-Frequency Lock, 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 May 4, **2018**).
- M. Huang, S. Chen, R. E. Gerald II, J. Huang, K. Woelk, NMR Studies of Loaded Microspheres, 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 May 4, **2018**).
- R. E. Gerald II, J. Huang, K. Woelk, M. Huang, L. Chi, W. V. Stoecker, S. Cartwright, Acupuncture-MRI Cancer Probe, 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 May 4, **2018**).
- A. R. Pfaff, K. Woelk, DIPDAP A Pulse Programming Concept for Considering the Effects of Spin-Spin and Spin-Lattice Relaxation during Frequency-selective Adiabatic Hyperbolic Secant Pulses (HS1), 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 - May 4, 2018).

- L. Chi, M. Huang, A. R. Pfaff, R. E. Gerald II, J. Huang, K. Woelk, Optimizing NMR Hardware and Pulse Sequences with CapPack<sup>™</sup> Devices, 59th Experimental NMR Conference (ENC), Orlando, FL (March 29 May 4, **2018**).
- K. M. Lee, M. Huang, K. Woelk, NMR pH Measurements using the <sup>19</sup>F Chemical Shift of 2-Fluoro-3-hydroxymethylpyridine, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 17, **2018**).
- K. Woelk, J. Huang, S. N. Herndon, R. Block, R. E. Gerald II, Acupuncture Magnetic Resonance Imaging for Skin Cancer Detection, 2<sup>nd</sup> Annual Ozark Biomedical Initiative Research Symposium (OBIRS 2017), Missouri S&T (August 19, **2017**).
- S. N. Herndon, D. Niyogi, R. E. Gerald II, K. Woelk, Identification of Phosphorus Species in the Mill Creek Watershed via Nuclear Magnetic Resonance, Undergraduate Research Conference, Missouri S&T (April 11, **2016**).
- R. Block, S. N. Herndon, R. E. Gerald II, K. Woelk, J. Huang, Improving the Quality and Availability of Medical Diagnostics through Acupuncture-MRI, Undergraduate Research Day at the Capitol, Jefferson City, MO (March 15, **2016**).
- R. Block, S. N. Herndon, R. E. Gerald II, K. Woelk, Application of in vivo Nuclear Magnetic Resonance Toroid Cavity Detectors to Miniaturize and Improve the Quality of Medical Magnetic Resonance Imaging, 3<sup>rd</sup> Branson NMR Meeting, Branson, MO (October 17, **2015**) & ACS Midwest Regional Meeting (MWRM2015), St. Joseph, MO (October 21-24, **2015**).
- S. N. Herndon, R. Block, R. E. Gerald II, K. Woelk, Analysis of cellular secretions via conventional nuclear magnetic resonance, 3<sup>rd</sup> Branson NMR Meeting, Branson, MO (October 17, **2015**); ACS Midwest Regional Meeting (MWRM2015), St. Joseph, MO (October 21-24, **2015**).
- R. J. Klingler, L. Chi, R. E. Gerald II, K. Woelk, A Revised NNLS Approach to High-Resolution NMR Relaxometry, 56<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 19 24, **2015**).
- L. Chi, R. Block, S. N. Herndon, R. E. Gerald II, K. Woelk, Integration Standard for MAS-NMR Investigations, 56<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 19 24, **2015**).
- S. N. Herndon, R. Block, R. E. Gerald II, K. Woelk, Analysis of Cellular Secretions via NMR and Toroid Cavity Probes, Undergraduate Research Conference, Missouri S&T (April 15, **2015**).
- R. Block, R. E. Gerald II, K. Woelk, Application of in vivo Nuclear Magnetic Resonance Toroid Cavity Detectors to Improve Quality and Availability of Medical Magnetic Resonance Imaging, Undergraduate Research Conference, Missouri S&T (April 15, **2015**).
- L. Chi, M. Huang, R. E. Gerald II, K. Woelk, Calibration CapPack<sup>™</sup> Devices for Magic Angle Spinning (MAS) NMR Experiments, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 15, **2014**).
- M. Huang, K. Hogan, R. Block, T. Mustaquim, S. N. Herndon, R. É. Gerald II, K. Woelk, Development of in situ NMR pH Meter Based on <sup>19</sup>F Chemical Shifts, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 – 15, **2014**).
- M. Huang, K. Czeschin, F. S. Bush, C. L. Parrish, M. N. Rector, R. E. Gerald II, K. Woelk, NMR *T*<sub>1</sub> Analyses of Multiple Sample Tubes Tested Simultaneously, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 – 15, **2014**).
- P. G. Hughes Luebbert, A. Demster, Y. Liang, K. Woelk, Voltammetric Behavior of Resistors, Capacitors, Ionic Solutions, and Solvents, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 15, **2014**).
- R. Block, S. N. Herndon, M. Huang, R. E. Gerald II, K. Woelk, Benefits of Using Automated Systems for Collection of NMR Data, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 15, **2014**).
- L. Chi, R. E. Gerald II, K. Woelk, Fundamentals of Rotating Frame Imaging in Toroid Cavity Detectors, ACS Midwestern Regional Meeting (MWRM2014), Columbia, MO (November 12 15, **2014**).
- L. Chi, R. E. Gerald II, K. Woelk, Advanced CapPack<sup>™</sup> Devices: Multiple Functions for Quantitative NMR Applications, 2014 Graduate Research Showcase, Missouri S&T (April 10, **2014**).
- M. Huang, Q. Yang, Y. Ma, R. E. Gerald II, K. Woelk, Fiber-optic Based in situ NMR Spectroscopy for Nanoparticles Cytotoxic Mechanism Investigation, 2014 Graduate Research Showcase, Missouri S&T (April 10, **2014**).
- L. Chi, J. Huang, M. Huang, R. E. Gerald II, K. Woelk, Two CapPack<sup>™</sup> Devices for Solution and Solid State NMR Applications, 55<sup>th</sup> Experimental NMR Conference (ENC), Boston, MA (March 23-28, **2014**).
- M. Huang, L. Chi, R. E. Gerald II, K. Woelk, Development of an In situ NMR pH Meter, 55th Experimental NMR Conference (ENC), Boston, MA (March 23-28, **2014**).
- L. Chi, R. E. Gerald II, K. Woelk, Quantitative NMR/MRI Using the Toroid Cavity Detector/Imager, Practical Applications of NMR in Industry Conference (PANIC) 2014, Charlotte, NC (February 3-5, **2014**).
- M. Huang, A. Buyukaksoy, R. E. Gerald II, K. Woelk, Analysis of Simultaneous *T*<sub>1</sub> Measurements of Non-Interacting Samples, 54<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 14 19, **2013**).
- L. Chi, A. R. Pfaff, R. E. Gerald II, K. Woelk, Absolute qHNMR Calibration and the Use of Cap-Packs to Assess the Effectiveness of EXCEPT-20 for Water-Signal Suppression, 54<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 14 – 19, **2013**).
- B. Basler, K. Woelk, Using Carbonate Buffers to Maximize the Yield of Liquid Fuel Precursors from Hydrothermal Biomass Conversion, Undergraduate Research Conference, Missouri S&T (April 3, **2013**).
- R. E. Gerald II, M. Huang, K. Woelk, Analysis of Complicated Model *T*<sub>1</sub> Curves, Practical Applications of NMR in Industry Conference (PANIC) 2012, Schaumburg, IL (October 16, **2012**).

- A. R. Pfaff, R. E. Gerald II, K. Woelk, CapPack<sup>™</sup>: A New Device for Testing Solvent Suppression Sequences, Practical Applications of NMR in Industry Conference (PANIC) 2012, Schaumburg, IL (October 16, **2012**).
- L. Chi, R. E. Gerald II, K. Woelk, Quantitative HNMR Tests for Determining the Mass Percentage of Small Molecules in Biomass Conversion Reactions, Practical Applications of NMR in Industry Conference (PANIC) 2012, Schaumburg, IL (October 16, **2012**).
- E. T. Satterfield, K. Woelk, Would You Like to See Where Your Magnetization is Really Headed? Accurate Monitoring of *x*, *y*, and *z* Magnetization at any Point in Your Pulse Sequence, Samuel Weissman Symposium, Washington University, St. Louis, MO (May 10 11, **2012**).
- W. Zhang, A. R. Pfaff, E. T. Satterfield, K. Woelk, We Don't Need Another Solvent-Suppressing Presaturation Sequence ... EXCEPT (EXponentially Converging Eradication Pulse Train) for Water-Signal Suppression in Biomass-to-Fuel Investigations, Samuel Weissman Symposium, Washington University, St. Louis, MO (May 10 – 11, 2012).
- E. T. Satterfield, K. Woelk, No More Solvent Signals EXCEPT in One- and Two-Dimensional NMR Spectroscopy, 53<sup>rd</sup> Experimental NMR Conference (ENC), Miami, FL (April 15 – 20, 2012).
- L. Chi, J. A. Cobb, A. C. Mollhagen, D. K. Ludlow, K. Woelk, R. E. Gerald II, Quantitative NMR to Determine the Kinetics of the Hydrothermal Degradation of D-Glucose, 53<sup>rd</sup> Experimental NMR Conference (ENC), Miami, FL (April 15 20, **2012**).
- R. E. Gerald II, L. Chi, K. Woelk, Spin-Lattice Relaxation Time-Constant Distributions of Heterogeneous Samples Used as Models for Shale, 53<sup>rd</sup> Experimental NMR Conference (ENC), Miami, FL (April 15 – 20, **2012**).
- J. A. Cobb, L. Chi, R. E Gerald II, K. Woelk, D. K. Ludlow, Recent Improvements in Hydrothermal Biomass Conversions to Obtain Liquid Fuel Precursors, Graduate Research Showcase, Missouri S&T (April 12, **2012**).
- L. Chi, J. A Cobb, R. E. Gerald II, K. Woelk, Two Applications of NMR Spectroscopy for Future Fuels, Graduate Research Showcase, Missouri S&T (April 12, **2012**).
- R. E. Gerald II, L. Chi, H. Zhang, K. Woelk, Low-Field NMR Spin-Lattice Relaxation Time-Constant Distributions of Shale, 46<sup>th</sup> Midwest and 39<sup>th</sup> Great Lakes Joint Regional American Chemical Society (ACS) Meeting, St. Louis, MO (October 20, **2011**).
- E. T. Satterfield, K. Woelk, Accurate Monitoring of x, y, and z Magnetization at any Point in an NMR Pulse Sequence, 46<sup>th</sup> Midwest and 39<sup>th</sup> Great Lakes Joint Regional American Chemical Society (ACS) Meeting, St. Louis, MO (October 20, **2011**).
- E. T. Satterfield, K. Woelk, Would You Like to See Where Your Magnetization is Really Headed? Accurate Monitoring of x, y, and z Magnetization at any Point in Your Pulse Sequence, 52<sup>nd</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 10 15, 2011).
- A. C. Mollhagen, H. M. Cardwell, N. J. Carter, J. A. Cobb, M. E. Oldroyd, A. R. Pfaff, W. Zhang, K. Woelk, Let's put Sugar in Your Tank! ... Kinetic and Mechanistic Investigations into the Degradation of Glucose in Hot Compressed Water as a Model for Hydrothermal Biomass-to-Fuel Conversions, 45<sup>th</sup> American Chemical Society Midwest Regional Conference, Wichita, KS (October 27 – 30, **2010**).
- N. J. Carter, M. E. Oldroyd, K. Woelk, Hydrothermal Chemistry as a Pathway to Convert Cellulosic Biomass to Fuel, Undergraduate Research Day at the Capitol, Jefferson City, MO (April 29, **2010**).
- W. Zhang, A. R. Pfaff, E. T. Satterfield, K. Woelk, We Don't Need Another Solvent-Suppressing Presaturation Sequence ... EXCEPT (EXponentially Converging Eradication Pulse Train) for Water-Signal Suppression in Biomass-to-Fuel Investigations, 51st Experimental NMR Conference (ENC), Daytona Beach, FL (April 18 – 23, 2010).
- W. Zhang, K. Woelk, Advances in Hydrothermal Biomass-to-Fuel (BTF) Conversion, Graduate Research Showcase, Missouri S&T (April 12, **2010**)
- N. J. Carter, M. E. Oldroyd, E. T. Satterfield, W. Zhang, K. Woelk, Effects of Saline and Acidic Solutions on the Hydrothermal Degradation of Biomass, Undergraduate Research Conference, Missouri S&T (April 8, **2009**).
- M. Braun, K. Woelk, N. I. Gershenzon, T. E. Skinner, S. J. Glaser, Inhomogeneity-Robust RF-Pulses for Toroid Cavity Probes, 50th Experimental NMR Conference (ENC), Pacific Grove, CA (March 29 April 3, **2009**).
- E. T. Satterfield, N. Leventis, K. Woelk, A Gradient Recalled Echo Technique Yielding Relaxation and Diffusion Profiles for the Characterization of Lightweight Polymer Crosslinked Silica Aerogels, 49th Experimental NMR Conference (ENC), Pacific Grove, CA (April 9 14, **2008**).
- W. Zhang, N. J. Carter, M. E. Oldroyd, E. T. Satterfield, K. Woelk, NMR Investigations to Elucidate the Mechanisms of Hydrothermal Biomass Conversion Forming Black Coal or Precursor Chemicals for Liquid Fuel Production, 49th Experimental NMR Conference (ENC), Pacific Grove, CA (April 9 – 14, **2008**).
- N. I. Gershenzon, K. Woelk, S. J. Glaser, T. E. Skinner, RF Pulses with Extreme Tolerance to RF Field Inhomogeneity: Application to Toroid Cavity Detectors, 49<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 9 – 14, **2008**).
- K. Woelk, E. T. Satterfield, S. J. Glaser, Accurate Spin Echo Inversion in Imaging with Inhomogeneous B<sub>1</sub> Fields, 9<sup>th</sup> International Conference on Magnetic Resonance Microscopy (ICMRM9), Aachen, Germany (September 3 7, **2007**).
- E. T. Schmittzehe, J. Stadler, K. Woelk, T<sub>2</sub> Measurements and Rotating-Frame T<sub>2</sub> Profiling in Largely Non-Uniform B<sub>1</sub> Fields, 47<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 23 28, **2006**).
- A. M. Kluwer, J. Stadler, H. G. Niessen, K. Woelk, Imaging Interfaces Using the Phase Twist of Magnetization in Diffusive Edge Enhancement, 47<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 23 28, **2006**).

- O. H. Han, S. A. Chae, R. E. Gerald II, R. Diaz, R. J. Klingler, J. W. Rathke, K. Woelk, Hybrid Inductor for Near Electrode Imagers, 47<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 23 – 28, **2006**).
- U. Bommerich, H. G. Niessen, T. Jonischkeit, J. Stadler, K. Woelk, J. Bargon, Generating Long-Lasting <sup>1</sup>H and <sup>13</sup>C Hyperpolarization in Small Molecules with Parahydrogen Induced Polarization, 47<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 23 28, **2006**).
- J. Bargon, T. Jonischkeit, R. R. Rizi, K. Woelk, Long-Lasting <sup>1</sup>H Hyperpolarization in Molecules, 13<sup>th</sup> Scientific Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Miami FL (May 7 13, **2005**). — Honorable Mention Poster Award.
- A. Limbacher, T. Jonischkeit, K. Woelk, J. Bargon, Orthodeuterium Induced Nuclear Alignment, 17<sup>th</sup> European Experimental NMR Conference (EENC), Lille, France (September 6 11, **2004**).
- T. Jonischkeit, K. Woelk, J. Bargon, Hydrogen Induced Polarization Nuclear Spin Polarization in Hydrogenation Reactions Without Enriched Para- or Orthohydrogen, 45th Experimental NMR Conference (ENC), Pacific Grove, CA (April 18 – 24, **2004**).
- J. Stadler, K. Woelk, Spin-Lock Experiments in the Largely Non-Uniform *B*<sub>1</sub> Fields of Toroid Cavity Detectors, 45<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 18 24, **2004**).
- A. Limbacher, T. Jonischkeit, K. Woelk, J. Bargon, Orthodeuterium-Induced Nuclear Spin Polarization (Alignment) of Small Molecules, 45<sup>th</sup> Experimental NMR Conference (ENC), Pacific Grove, CA (April 18 24, **2004**).

Scholarchip of Teaching and Learning:

- S. B. Burchett, J. L. Hayes, K. Woelk, Electron Configuration Board Game: A New Way to Teach the Pattern of Electron Configuration. 251<sup>st</sup> American Chemical Society (ACS) National Meeting, San Diego, CA (March 13-17, **2016**).
- S. B. Burchett, K. Woelk, J. L. Hayes, A. R. Pfaff, A. Skyles, Blended Chemistry Laboratory Experience, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 3, **2015**).
- S. B. Burchett, J. L. Hayes, K. Woelk, A Comparison of Student Success in Online, On-Ground, and Hybrid Classrooms for a Non-Major Chemistry Course, Graduate Research Showcase, Missouri S&T (April 10, **2014**).

**Invited Talks and Conference Lectures** (150+ while at Missouri S&T)

### Scholarly Research:

- K. Lai, K. Woelk, Refinement of Relaxation Coefficients in Nuclear Magnetic Resonance, 2022 Missouri Academy of Science Annual Meeting, Fayette, MO (April 23, **2022**).
- A. Q. Hermelink, K. Woelk, NMR Relaxometry of Syngas-to-methanol Conversion, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 14, **2022**).
  - Second Place, Sciences Oral Presentations
- K. Woelk, Materials Characterizations Using High-resolution NMR Relaxometry, Department of Chemistry and Biochemistry, Kennesaw State University, Kennesaw, GA (February 2, **2022**).
- Z. G. Mayes, M. R. Sly, P. O. Aina, K. Woelk, RAPTOR Rapid Acquisition Pulse-Train for Observing Relaxation in NMR, ACS Midwest Regional Meeting (MWRM2021), Springfield MO (October 22, **2021**).
- K. Woelk, High-resolution NMR Relaxometry with a Benchtop NMR Spectrometer, ACS Midwest Regional Meeting (MWRM2021), Springfield MO (October 21, 2021).
- L. M. Kehoe, M. R. Sly, B. P. Salunkhe, T. J. Schuman, K. Woelk, Chemical-shift Resolved High-resolution Nuclear Magnetic Resonance Relaxometry of Polymer Hydrogels, 2021 Missouri Academy of Science Annual Meeting, Columbia MO (April 24, 2021).
- M. R. Sly, K. Woelk, Chemically Resolved Nuclear Spin Relaxation, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 14, **2021**).
- K. E. Brakensiek, K. Woelk, Nuclear Spin Relaxation in NMR Spectroscopy, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 16, **2019**).
  - First Place, Sciences Oral Presentations
- K. M. Lee, K. Woelk, Optimizing D<sub>2</sub>O/H<sub>2</sub>O Ratio for NMR pH Measurements, Undergraduate Research Conference, Missouri S&T, Rolla, MO (April 16, **2019**).
  - Second Place, Sciences Oral Presentations
- M. Huang, M. Parker, K. Woelk, J. Huang, R. E. Gerald II, Simple Laser System for Hyperpolarized NMR Experiments, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 8, 2019)
- L. M. Kehoe, M. Huang, R. E. Gerald II, K. Woelk, Saturation-transfer Difference Nuclear Magnetic Resonance (NMR) Experiments to Probe into Interactions Between Small Molecules and Colloidal Polymers, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 8, **2019**).

- E. L. Wideman, L. M. Kehoe, L. Chi, M. Huang, B. Gamelin, R. E. Gerald II, K. Woelk, *T*<sub>1</sub> CapPack<sup>™</sup> (Capillary-tube Package) Devices for Determining the Effects of Spin-Lattice Relaxation on Nuclear Magnetic Resonance (NMR) Pulse Sequences, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 8, **2019**).
- K. M Lee, M. Huang, K. Woelk, <sup>19</sup>F Nuclear Magnetic Resonance (NMR) Measurements Using 2-Fluoro-3hydroxymethylpyridine as a pH-sensitive Compound, 51<sup>st</sup> Annual Southeastern Undergraduate Research Conference (SURC), University of Tennessee, Martin, TN (February 8, **2019**).
- K. M. Lee, M. Huang, K. Woelk, NMR-spectroscopic pH Determination using <sup>19</sup>F Chemical-shift Data, The Annual Meeting of the Missouri Academy of Science, Missouri S&T, Rolla, MO (April 28, **2018**).
- K. Woelk, The NMR Institute at Missouri S&T, Brewer Science, Rolla, MO (April 13, 2017).
- K. Woelk, High-Resolution NMR Relaxometry, 38th German Chemical Society Magnetic Resonance Division (FGMR) Discussion Meeting, Heinrich Heine University, Düsseldorf, Germany (September 13, **2016**).
- K. Woelk, From NMR Relaxation Experiments to High-Resolution NMR Relaxometry, Organic Chemistry Seminar Series, Department of Chemistry, University of Missouri, Columbia, MO (October 26, **2015**).
- M. Huang, R. E. Gerald II, K. Woelk, Methods for qNMR: Spin Counting in the NMR Coil Volume, ACS Midwest Regional Meeting (MWRM2015), St. Joseph, MO (October 23, **2015**).
- K. Woelk, From Inversion Recovery and CPMG to High-Resolution NMR Relaxometry, 2015 American Chemical Society (ACS) Saint Louis Award Symposium and Banquet, Washington University, St. Louis, MO (October 16, **2015**).
- K. Woelk, From Standard NMR Relaxation Experiments to High-Resolution Relaxometry, Chemistry Department, Missouri S&T (September 28, **2015**).
- R. J. Klingler, K. Woelk, A Revised NNLS Approach to High-Resolution NMR Relaxometry, 56th Experimental NMR Conference (ENC), Pacific Grove, CA (April 23, 2015).
- L. Chi, R. E. Gerald II, K. Woelk, CapPack<sup>™</sup> Devices, Missouri TechExpo, Columbia, MO (October 16, 2014).
- L. Chi, K. Woelk, R. E. Gerald II, R. J. Klingler, P. Novak, A. R. Pfaff, M. Huang, J. Huang, E. T. Satterfield, A. C. Mollhagen, Cap-Pack Devices for Quantitative NMR/MRI Investigation, 2013 Chicago Area Discussion Group, Argonne National Laboratory IL (November 9, **2013**).
- R. E. Gerald II, K. Woelk, B. Bai, L. Chi, M. Huang, A. R. Pfaff, Subdivision of Zeeman NMR Fields by Static and Dynamic Magnetic Field Distributions and Capillary Tube Compartments Applications of Quantitative NMR/MRI Employing Cap-Pack Devices, Department of Physics and Astronomy, University of Missouri, Columbia, MO (October 30, **2013**).
- R. E. Gerald II, K. Woelk, B. Bai, L. Chi, M. Huang, A. R. Pfaff, Applications of Quantitative NMR/MRI Employing Cap-Pack Devices, Department of Chemistry, Massachusetts Institute of Technology, Cambridge, MA (October 15, **2013**).
- K. Woelk, Revisiting the Relaxation of Hyperpolarized Nuclear Spin States, Samuel Weissman Symposium, Washington University, St. Louis, MO (May 12, **2012**).
- K. Woelk, Liquid Transportation Fuels From Hydrothermal Degradation of Biomass, American Chemical Society (ACS) Local Section Energy Workshop, Brewer Science, Rolla (November 18, **2011**).
- K. Woelk, Toroid Cavity Detectors for in situ NMR Spectroscopy and Imaging, Technical University Munich, Germany (May 6, **2011**).
- W. Zhang, K. Woelk, NMR Investigations into Hydrothermal Biomass-to-Fuel (BTF) Conversion Using Glucose as Model Substrates for Cellulosic Biomass, 45<sup>th</sup> American Chemical Society Midwest Regional Conference, Wichita, KS (October 28, 2010).
- K. Woelk, Expanding the Toroid-Cavity Platform with Radiofrequency Pulses Shaped by Optimal-Control Theory, Technical University Munich, Germany (August 30, **2010**).
- N. J. Carter, M. E. Oldroyd, K. Woelk, A Systematic Investigation into the Hydrothermal Degradation of Biomass as a Renewable Alternative Fuel Source, Undergraduate Research Conference, Missouri S&T (April 7, **2010**).
- K. Woelk, High-Pressure in situ NMR Spectroscopy and Imaging Studies, Physics Department, Missouri S&T (September 24 **2009**).
- K. Woelk, Extremely Heavy but Very Volatile, Bright White but Pitch Black, Lifesaving but Highly Toxic A Foray into the Chemistry of Lead, ACS Local Section, Missouri S&T (April 2, **2007**).
- K. Woelk, Toroid Cavity NMR Spectroscopy for Material Science Studies, Institute of Solid State Research, Jülich Research Center, Jülich, Germany (March 14, **2007**).
- K. Woelk, Extremely Heavy but Very Volatile, Bright White but Pitch Black, Lifesaving but Highly Toxic A Foray into the Chemistry of Lead, 4<sup>th</sup> Stolberg Colloquium on Historical Engineering, Stolberg, Germany (March 10, **2007**).
- K. Woelk, The Toroid Cavity Technology for in situ NMR Spectroscopy and Imaging, Global Studies Minor Program, Missouri S&T (January 25, 2007).
- K. Woelk, The Toroid Cavity Technology for in situ NMR Spectroscopy and Imaging, Chemistry Department, University of Missouri-Kansas City (October 5, 2006).

- K. M. Varcoe, K. M. Baldwin, I. Blakey, T. Jonischkeit, J. Stadler, K. J. Thurecht, A. K. Whittaker, K. Woelk, In situ Monitoring of Polymer Swelling in Supercritical CO<sub>2</sub> using <sup>129</sup>Xe NMR and <sup>1</sup>H NMR, 3<sup>rd</sup> International Symposium on Xenon NMR of Materials (XeMAT), Ottawa, Canada (June 3, **2006**).
- K. Woelk, Partial Differential Equations, Fourier Transformation, and Finite Differences "Math Tools" for Analyzing the Mobility in Viscous Fluids, Mathematics and Statistics Department, Missouri S&T (February 20, **2006**).
- K. M. Varcoe, K. M. Baldwin, I. Blakey, T. Jonischkeit, J. Stadler, K. J. Thurecht, A. K. Whittaker, K. Woelk, In situ Monitoring of the Swelling of Polymers in Supercritical Carbon Dioxide with High Pressure <sup>129</sup>Xe and <sup>1</sup>H NMR, 28<sup>th</sup> Australasian Polymer Symposium (APS2006) and Australasian Society for Biomaterials 16<sup>th</sup> Annual Conference, Rotorua, New Zealand (February 6, **2006**).
- K. Woelk, The Toroid Cavity Autoclave for High-Pressure in situ NMR Studies, Department of Material Science and Engineering, Missouri S&T (April 14, **2005**).
- K. Woelk, High-Pressure Techniques to Study Chemical Reactions with NMR, COST Chemistry Action D30 Working Group Meeting, Tarragonna, Spain (Novenber 20, 2004).
- K. Woelk, Talmi, Tombac, and Aurichalkum Insights into the Structures of Brass, 3<sup>rd</sup> Stolberg Colloquium on Historical Engineering, Stolberg, Germany (September 11, **2004**).
- K. Woelk, A new Concept to Perform Spin-Echo Experiments in Largely Nonuniform *B*<sup>1</sup> Gradients, 17<sup>th</sup> European Experimental NMR Conference (EENC), Lille, France (September 10, **2004**).
- K. Woelk, The Toroid Cavity Autoclave for High-Pressure in situ NMR Studies, 42<sup>nd</sup> European High Pressure Research Group (EHPRG) Meeting, Lausanne, Switzerland (September 3, **2004**).
- K. Woelk, Parahydrogen Induced Polarization (PHIP) to Enhance Contrast in Magnetic Resonance Imaging (MRI), University of Amsterdam, The Netherlands (February 4, 2004).

# Scholarchip of Teaching and Learning:

- E. T. Schmittzehe, K. Woelk, One Size Doesn't Fit All Learning Options to Address Diverse Student Needs, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (September 29, **2017**).
- K. Woelk, The Higher Education Core Curriculum Transfer Act (SB 997), Chancellor's Student Success Committee, Missouri S&T (March 23, 2017).
- K. Woelk, The Missouri S&T General Chemistry Course Redesign, The Faculty of Natural Sciences, University of the Western Cape, Bellville, Republic of South Africa (May 25, **2016**).
- K. Woelk, S. B. Burchett, Enhanced Student Engagement and Learning in a Blended Laboratory Course, Teaching and Learning Technology Conference, Missouri S&T (March 18, **2016**).
- A. R. Pfaff, S. B. Burchett, J. L. Hayes, K. Woelk, GTA-centered Training to Improve Undergraduate Motivation in a Blended Freshman General Chemistry Lab, 251<sup>st</sup> American Chemical Society (ACS) National Meeting, San Diego, CA (March 17, **2016**).
- S. B. Burchett, J. L. Hayes, K. Woelk, Living Lab Manuals: An Interactive Platform for Communication between Students and Instructors, 251st American Chemical Society (ACS) National Meeting, San Diego, CA (March 15, **2016**).
- A. R. Pfaff, S. B. Burchett, J. L. Hayes, K. Woelk, GTA-Centered Training to Improve Undergraduate Motivation in a Blended Freshman General Chemistry Lab, 251<sup>st</sup> American Chemical Society (ACS) National Meeting, San Diego, CA (March 14, **2016** & March 17, **2016**).
- S. B. Burchett, J. L. Hayes, K. Woelk, A Novel approach to molecular modeling using line drawings, molecule kits, and found materials, 251<sup>st</sup> American Chemical Society (ACS) National Meeting, San Diego, CA (March 13, **2016**).
- S. B. Burchett, J. L. Hayes, K. Woelk, Motivate Students in Labs and Classrooms through Blended Learning, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 13, **2015**).
- S. B. Burchett, J. L. Hayes, K. Woelk, Student Success in Face-to-Face, Blended, and Online Chemistry Courses: Analysis and Discussion of the Modalities as Applied by a Research University and a Community College, 50<sup>th</sup> Midwestern Regional American Chemical Society (ACS) Meeting, St. Joseph, MO (October 22, **2015**).
- S. B. Burchett, J. L. Hayes, K. Woelk, Pilot of a Blended General Chemistry Laboratory Course to Increase Course Capacity and Improve Learner Success in a Large Enrollment Course, 250<sup>th</sup> American Chemical Society (ACS) National Meeting & Exposition, Boston, MA (August 18, **2015**).
- S. B. Burchett, J. L. Hayes, K. Woelk, Metamorphosis Transforming a General Chemistry Lab to a Blended Course, 249<sup>th</sup> American Chemical Society (ACS) National Meeting & Exposition, Denver, CO (March 24, **2015**).
- K. Woelk, Active Learning, Flipped Classroom, Peer Instruction Buzzword Concepts Applied to Online and Blended Learning, Marshall University, Huntington, WV (March 10, **2015**).
- K. Woelk, Buffet-Model Redesign of a Multiple-Section Science Course, Marshall University, Huntington, WV (March 10, **2015**).
- S. B. Burchett, K. Woelk, Pilot of a Blended General Chemistry Wet Lab to Optimize Campus Resources While Maintaining ACS Standards. 49<sup>th</sup> Midwestern Regional American Chemical Society (ACS) Meeting, Columbia, MO (November 15, **2014**).

- K. Woelk, Active Learning, Flipped Classroom, Peer Instruction Buzzword Concepts Applied to Online and Blended Learning, Colorado School of Mines, Golden, CO (September 12, **2014**).
- K. Woelk, The Value of Graduate and Undergraduate Assistants in Collaborative Learning and Peer-led Education, Teaching and Learning Technology Conference, Missouri S&T (March 13, 2014).
- E. T. Satterfield, K. Woelk, Collaborative Recitation Sections, LEAD@S&T Conference, Missouri S&T (February 11, 2014).
- K. Woelk, Assisting Teaching with Graduate Teaching Assistants (GTAs) Assisting Learning with Undergraduate Learning Assistants (ULAs), Focus on Teaching and Technology Conference, University of Missouri-St. Louis (October 25, **2013**).
- K. Woelk, Major Course Redesign Best Practices, Calculus Redesign Discussion, Missouri S&T (September 11, 2013)
- K. Woelk, General Chemistry I Major Course Redesign, Missouri S&T Academic Retreat, Rolla, MO, (August 9, 2013).
- K. Woelk, Online Doesn't Mean Left Alone, Missouri Teaching Symposium: Course Redesign, Technology and Scholarship, Columbia, MO (June 21, **2013**).
- K. Woelk, Targeting Diverse Learning Needs with a Buffet-Model Course Redesign, Lincoln University, Jefferson City, MO (April 2, **2013**).
- K. Woelk, Whole-Course Redesign in General Chemistry using a Buffet of Technology-Supported Active Learning Strategies, Faculty Development Day, Southeast Missouri State University, Cape Girardeau, MO (January 9, **2013**).
- K. Woelk, More than Clickers Whole-Course Redesign in General Chemistry Using a Buffet of Technology-Supported Active Learning Strategies, Oklahoma State University, Stillwater, OK (November 1, **2012**).
- K. Woelk, Targeting Diverse Learning Needs with a Buffet Redesign Model, CITE 2012, Orlando, FL (April 12, 2012).
- K. Woelk, Targeting Diverse Learning Needs in General Chemistry with a Buffet Redesign Model, The Windy City Event Improving Outcomes Through Technology, Loyola University, Chicago, IL (February 24, **2012**)
- K. Woelk, Surprising Uses of PowerPoint<sup>®</sup> to Increase Student Engagement, Faculty Learning Community, Missouri S&T (February 17, **2012**)
- K. Woelk, Pedagogical Benefits of Using Clickers in the Classroom, Pennsylvania State System of Higher Education (PASSHE) Webinar Series (February 14, **2012**).
- K. Woelk, Targeting Diverse Learning Needs in Basic Science with a Buffet Redesign Model, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 10, **2011**).
- K. Woelk, Targeting Diverse Learning Needs in General Chemistry with a Buffet Redesign Model, 46<sup>th</sup> Midwest and 39<sup>th</sup> Great Lakes Joint Regional American Chemical Society (ACS) Meeting, St. Louis, MO (October 20, **2011**).
- K. Woelk, A Decade of Redesigning General-Chemistry Teaching and Learning, Pearson Course-Redesign Conference 2011, Orlando, FL (September 23, 2011).
- J. Winiarz, K. Woelk, R. Bieniek, Student Engagement in Faculty-Guided Collaborative Learning: A LEADing Experience at Missouri S&T, Implementing High-Impact Educational Experiences in STEM Departments, University of Missouri-St. Louis (April 26, 2011).
- K. Woelk, Modern Student-Faculty Communication Used in Chemistry Education at Missouri S&T, Implementing High-Impact Educational Experiences in STEM Departments, Chemistry Department, University of Missouri-St. Louis (April 26, **2011**).
- K. Woelk, Using MasteringChemistry<sup>®</sup> for Effective Homework Assignments and Personalized Tutoring, Teaching and Technology Summit, Orlando, FL (March 25, **2011**).
- K. Woelk, T. Wilson, MasteringChemistry<sup>®</sup> Online Platform as a Tool in Course Redesign, Teaching and Learning Technology Conference, Missouri S&T (March 10, **2011**).
- P. Carr, K. Woelk, K. Grasman, Online Homework, Faculty Learning Community, Missouri S&T (February 16, 2011).
- C. Hess, R. Pribush, K. Woelk, Course Redesign Personal Remarks, Pearson Education Annual Meeting, Phoenix, AZ (January 4, 2011).
- K. Woelk, Instant Text Messaging can Augment Student-Faculty Classroom Interaction, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 12, **2010**).
- R. Bieniek, P. Fleck, K. Woelk, What you Need to Know Now so that Your Following Weeks are Easier, New Faculty Welcome and Orientation, Missouri S&T (August 19, **2010**).
- K. Woelk, Optimizing the Use of Clickers in the Classroom, Teaching and Learning Technology Conference, Missouri S&T (March 11, **2010**).
- K. Woelk, Texting as a Teaching Tool, Teaching and Learning Technology Conference, Missouri S&T (March 11, 2010).
- P. Carr, J. Harper, K. Woelk, Blackboard Discussion Boards as Instructional Tool, Blackboard Faculty Learning Community, Missouri S&T (February 13, 2009).
- R. Bieniek, K. Woelk, Student Engagement and Teaching Techniques A Practical Guide, Freshman Faculty Forum (FFF), Missouri S&T (February 4, **2009**).
- D. Cernusca, K. Woelk, Encouraging Student-Faculty Contact, Active-Learning Faculty Learning Community, Missouri S&T (January 21, 2009).
- J. King, K. Woelk, Clicker Informational Presentation, Teaching and Learning Technology Conference, Missouri S&T (April 25, **2008**).

- K. Woelk, Interactive PowerPoint<sup>®</sup> Presentations to Facilitate Learning Activities, Teaching and Learning Technology Conference, Missouri S&T (April 25, **2008**).
- K. Woelk, Taxonomy of Clickers in the Classroom, Faculty Learning Community, Missouri S&T (Part 1: November 14, 2007; Part 2: December 12, 2007).
- K. Woelk, Using PowerPoint<sup>®</sup> Interactively to Facilitate Learning Activities in the Classroom, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 1, **2007**).
- K. Woelk, Personal Response System Clickers in the Classroom, Chemistry Department, Western Michigan University, Kalamazoo, MI (October 25, 2007).
- K. Woelk, The Challenge of Creating Effective Clicker Questions, Lunch'n Learn Faculty Learning Community, Missouri S&T (November 16, **2006**).
- K. Woelk, Utilizing the Full Potential of Clickers in Entry-Level Courses, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 3, **2006**).
- M. Gunderson, G. Wilson, D. K. Ludlow, K. Henthorn, K. Woelk, H. James, J. Dauve, Clickers Impact of Student Response Systems, 16<sup>th</sup> Annual Teaching Renewal Conference, Columbia, MO (February 24, **2006**).
- K. Woelk, Personal Response Devices to Enhance Student Engagement, 15th Annual Teaching Renewal Conference, University of Missouri, Columbia, MO (February 26, **2005**).
- K. Woelk, What you Need to Know During These First Weeks, Freshman Faculty Orientation and Welcome 2005, Missouri S&T (August 15, **2005**).

# Teaching and Learning Keynote and Plenary Lectures:

- K. Woelk, Online Doesn't Mean Left Alone, The Windy City Event, Harper College, Palatine, IL (March 22, 2013).
- K. Woelk, Why We Need Course Redesigns, Teaching and Learning Technology Conference, Missouri S&T (March 16, 2012).
- K. Woelk, The Best Teachers Continuously Redesign Their Courses, Course-Redesign Conference "Changing Times Changing Students", Oklahoma City, OK (February 25, 2011); Teaching and Technology Summit, Orlando, FL (March 25, 2011).
- K. Woelk, Facilitating Interactive Classroom Activities with PowerPoint<sup>®</sup>, Strategies for Success Teaching Workshop, Richland College, Dallas, TX (February 20, **2010**); Owens Community College, Toledo, OH (November 13, **2010**); Dutchess Community College, Poughkeepsie, NY (November 11, **2011**).

### Teaching and Learning Panel Presentations:

- M. Duncan, D. Hudson, K Woelk, C. Jarmon (facilitator), Missouri Improves Learning Outcomes Statewide, SXSWedu 2014, Austin, TX (March 5, **2014**).
- R. Brow, J. Hogan, R. Hutcheson, D. Reardon, K. Woelk, H. Collier (facilitator), The Impact of Clickers at S&T: How They Can Be Used to Enhance Learning in Your Classroom, Faculty Learning Community, Missouri S&T (March 6, **2012**).
- S. Long, K. Woelk, C. Collison, B. Hanna, L. Harp (facilitator), Best Practices for Using Online Homework, Strategies for Success Teaching Workshop, Dutchess Community College, Poughkeepsie, NY (November 11, **2011**).
- F. Fausz, A. Nichols, N. Quisenberry, J. Stacy, K. Woelk, M. Cohen (facilitator), Effective Teaching Tips from Award Winning Faculty, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 10, **2011**).

# Teaching and Learning Workshops:

- K. Woelk, E. T. Schmittzehe, Instructional Approaches Empowering Students to take a more Active Role in the Classroom, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (September 29, **2017**).
- K. Woelk, What You Need to Know Before Classes Begin, New Faculty Orientation, Missouri S&T (August 16, 2013).
- K. Woelk, Assessing the Results Chemistry, Missouri Course Redesign Initiative Workshop IV, Columbia, MO (March 5, 2013).
- K. Woelk, Win-Win: Undergraduate Learning Assistants, University of Missouri Faculty Scholars (UMFS) Retreat, Jefferson City, MO (February 22, **2013**, February 21, **2014**, February 22, **2015**).
- K. Woelk, The Buffet Model, Course Sharing Workshop, Missouri Course Redesign Initiative, Columbia, MO (October 4, **2012**).
- K. Woelk, R. Bieniek, What to Think about Now for Next Week and Why, New Faculty Orientation, Missouri S&T (August 16, **2012**).
- K. Woelk, Are Clickers Worth it?, Summer Course Redesign Follow-up Workshop, Missouri Learning Commons, Columbia, MO (July 9, **2012**).
- K. Woelk, Writing Good Clicker Questions, Faculty Learning Community, Missouri S&T (January 27, 2012).
- C. Collison, K. Woelk, Using MasteringChemistry<sup>®</sup> for Effective Homework Assignments and Personalized Tutoring, Strategies for Success Teaching Workshop, Dutchess Community College, Poughkeepsie, NY (November 11, **2011**).
- K. Woelk, Enhancing Student Engagement and Classroom Communication with Clickers and Text Messaging, Missouri Course Redesign Kick-off Workshop, Columbia, MO (September 28, **2011**).

- C. Jarmon, K. Wyrick, K. Woelk, Getting Started with Course Redesign, Pearson Course-Redesign Conference 2011, Orlando, FL (September 24, **2011**).
- K. Woelk, R. Bieniek, What to Think about for Next Week and Why, New Faculty Orientation, Missouri S&T (August 16, 2011).
- K. Woelk, R. Goedecker, Course Redesign with the MasteringChemistry<sup>®</sup> Online-Homework Platform Implementing High-Impact Educational Experiences in STEM Departments, Chemistry Department, University of Missouri-St. Louis (April 26, **2011**).
- K. Woelk, B. Bastic, Pedagogical Benefits of Using Clickers in the Classroom, Teaching and Learning Technology Conference, Missouri S&T (March 10, **2011**).
- J. P. Hogan, K. Woelk, Classroom Communications to Promote Active Learning, Active-Learning Faculty Learning Community, Missouri S&T (October 14, **2009**).
- D. Cernusca, K. Woelk, How to Write Good Clicker Questions, Clicker Faculty Learning Community, Missouri S&T (Part 1: October 22, 2008; Part 2: January 28, 2009).
- K. Woelk, Facilitating Interactive Classroom Activities with PowerPoint<sup>®</sup>, Strategies for Success Teaching Workshop, Baton Rouge Community College, Baton Rouge, LA (October 11, 2008); Monroe Community College, Rochester, NY (March 7, 2009); Houston Community College, Houston, TX (October 30, 2009).
- B. Buckley, K. Woelk, Using MasteringChemistry<sup>®</sup> for Effective Homework Assignments and Personalized Tutoring, Strategies for Success Teaching Workshop, Baton Rouge Community College, Baton Rouge, LA (October 11, **2008**); Monroe Community College, Rochester, NY (March 7, **2009**).
- K. Woelk, Syllabus Preparation Nuts and Bolts of a Smoothly Running Course at Missouri S&T, New Faculty Orientation, Missouri S&T (August 20, **2008**; August 19, **2009**).
- K. Woelk, Taxonomy of Clickers in the Classroom, Clicker Faculty Learning Community, Missouri S&T (Part 1: November 14, **2007**; Part 2: December 12, **2007**).
- K. Woelk, Motivational Games and Activities to Enhance Student Engagement in Large General Science Courses, Strategies for Success Teaching Workshop, The College of New Jersey, Ewing NJ (November 10, 2007); Georgia Perimeter College, Clarkston, GA (April 5, 2008); Richland College, Dallas, TX (February 20, 2010); Owens Community College, Toledo, OH (November 13, 2010).
- K. Woelk, Using PowerPoint<sup>®</sup> Interactively to Facilitate Learning Activities in the Classroom, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 1, **2007**).
- K. Woelk, Personal Response System Clickers in the Classroom, Chemistry Department, Western Michigan University, Kalamazoo, MI (October 25, **2007**).
- K. Woelk, The Challenge of Creating Effective Clicker Questions, Lunch'n Learn Faculty Learning Community, Missouri S&T (November 16, **2006**).
- K. Woelk, Utilizing the Full Potential of Clickers in Entry-Level Courses, Focus on Teaching and Technology Conference, University of Missouri-St. Louis (November 3, **2006**).
- K. Woelk, "Click" I am Here, "Click" I am Prepared, "Click" I am Interested, "Click" I Learn, "Click" I Understand, and "Click" – I Apply: A Taxonomy of Clicker Questions, Faculty Center of Excellence in Teaching (FaCET), University of Missouri-Kansas City (March 1, 2006).
- K. Woelk, Clickers in the Classroom A Faculty Experience Report, CERTI/IT Faculty Workshop, Missouri S&T (August 5, 2005; June 13, 2006).
- K. Woelk, Personal Response Devices to Enhance Student Engagement, 15th Annual Teaching Renewal Conference, University of Missouri, Columbia, MO (February 26, **2005**).
- K. Woelk, What you Need to Know During These First Weeks, Freshman Faculty Orientation and Welcome 2005, Missouri S&T (August 15, 2005).

# Academic Service:

K. Woelk, The Importance of Academic Service, Freshman Faculty Forum (FFF), Missouri S&T (September 7, 2005).