Debbie Gale Mitchell

Address: FW Olin Hall, Room 202, 2190 E Iliff Ave. Denver, CO **Email:** debbie.mitchell@du.edu **Phone:** 303-871-4182

Current Positions

Assistant Teaching Professor *September 2015–Present*
Department of Chemistry & Biochemistry
University of Denver

Director, Science & Engineering Center
University of Denver *August 2013–Present*

Education

Ph.D., Chemistry
University of Denver, Denver, CO *Aug. 2008–Aug. 2013*
Dissertation: X-band Rapid-scan Electron Paramagnetic Resonance

B.S., Chemistry, *magna cum laude*
Brigham Young University, Provo, UT *Sept. 2004–July 2008*

Professional and Teaching Experience

Adjunct Faculty/Lecturer
University of Denver *March 2013–Aug 2015*

- CHEM 1010 General Chemistry Lecture (Fall 2013, Fall 2014, Summer 2015)
- CHEM 2011 Analytical Chemistry Lecture (Winter 2015)
- CHEM 2131 Sophomore-level Inorganic Chemistry Lecture (Spring 2013, 2014, and 2015)
    - Faculty member with full responsibility for a class of 60–110 students. Responsible for developing and presenting lectures, assigning and grading homework, writing and grading exams, and maintaining records on Canvas.

Adjunct Faculty
Brigham Young University-Idaho Online Learning *March 2013–April 2014*

- CHEM 101 General Chemistry Lecture (Fall 2013 and Winter 2014)
- CHEM 101L General Chemistry Lab (Fall 2013 and Winter 2014)
    - Faculty member with full responsibility for class sections of 30–50 students. Developed and presented supplemental lectures, assigned and graded homework and exams, held remote office hours, and maintained records through Ilearn LMS.

Course Developer
Brigham Young University-Idaho Online Learning *April 2013–August 2014*

- CHEM 101 General Chemistry
    - Develop practice problems and videos to enhance students' online experience. Research and implement new types of software and technology to improve course design.

Graduate Research Assistant, Dr. Gareth and Dr. Sandra Eaton
University of Denver *July 2008–July 2013*

- Collaborated on a team of engineers, chemists, and physicists to develop X-band rapid-scan electron paramagnetic resonance (EPR) methodology and demonstrate application to solving problems in materials science and biomedicine.
- Mentored 5 undergraduate research assistants.

Graduate Teaching Assistant

University of Denver

- Inorganic Chemistry Lab *March 2009–June 2009*
  - Instructor of 2 lab sections (~20 students each). Responsible for teachinglab techniques, graded reports, maintained records on Blackboard, and proctored exams.
- Natural Sciences Lab *Sept. 2008–March 2009*
  - Instructor in lab for 2 lab sections (~20 students each). Guided students, prepared solutions and materials for lab, graded reports, and maintained records on Blackboard.

Research Assistant, Dr. Eric Sevy

Brigham Young University *Jan. 2005–July 2008*

- Collaborated with a team of 5 people to measure unimolecular energy transfer using excimer pump/IR probe spectroscopy.

Undergraduate Teaching Assistant

Brigham Young University

- General Chemistry Lecture Course 1&2 *Aug. 2006–Dec. 2007*
  - Instructed ~40 students in a weekly recitation lecture and discussion, graded homework and exams, kept records on Blackboard, and proctored exams.
- Analytical Chemistry Lab Course *April 2007–June 2007*
- Organic Chemistry Lab Course *June 2006–Aug. 2006*
- Newtonian Physics Lecture Course *Aug. 2005–April 2006*

Curriculum Development (University of Denver)

Freshman Seminar: Chemistry & Art *Fall 2016 and 2017*

- Developed 8 labs including brass etching, pinhole photography, cyanotypes, paint binders, vat dyes, copper patinas, frescoes, and color.

Chemistry of the Elements Lab *Spring 2017*

- Developed new labs for Elements lab. Most labs were adapted from previous versions to fit the new chemistry sequence.

Workshops/Short Courses

Chemistry through Journaling *February–March 2020*

- Taught an after-school program for at Vivian Elementary (Lakewood, CO) every Wednesday afternoon for 6 weeks. ~15 students participated. K-5 students learned how to keep a lab notebook and about concepts such as catalysts (elephant toothpaste), polymers and redox (indigo vat dying), photochemistry (cyanotypes), ideal gas law (liquid nitrogen and handwarmer experiments), pH (cabbage juice indicator), and light/color (prisms).

IES/SharedEPR Summer School on EPR Spectroscopy *July 2019*

- Taught ~30 students (a mix of graduate students & professionals) how CW EPR can be used to study tumbling correlation times for nitroxyl radicals.

Grants (Sept. 2015–2020)

1. **Moreland Grant** (Spring, 2020): Revision on previous grant to incorporate information literacy assignments into Chemistry of the Elements
2. **CCESL mini grant** (October, 2019) and public good fellow (April 2019), which allowed me to fund outreach activities at Vivian Elementary School in Lakewood, CO
3. **Olin Faculty Development Grant** (Spring, 2018), which allowed me to attend and present at 2018 Biennial Conference on Chemical Education (BCCE)
4. **Olin Faculty Development Grant** (Spring, 2016), which allowed me to attend and present at 2016 Biennial Conference on Chemical Education (BCCE)
5. **Moreland Grant** (Winter, 2016): award through DU Library for incorporating information literacy assignments in a chemistry major classroom
6. DU Office of Teaching & Learning **"One New Thing"** grant for experimenting with a flipped classroom (Fall, 2015)

Unfunded External Grants

1. National Science Foundation (AGS): *Obtaining a deeper understanding of the photolysis of polycyclic aromatic hydrocarbons (PAH) in the presence of iron: their role in the production of humic-like substances*. (April, 2020).
2. National Science Foundation (AGS): *Obtaining a deeper understanding of the photolysis of polycyclic aromatic hydrocarbons (PAH): their role in the production of HULIS and in the solubilization of atmospheric iron.* (Oct. 2018).
3. National Science Foundation (AGS): *Obtaining a deeper understanding of the photolysis of polycyclic aromatic hydrocarbons (PAH): their role in the production of HULIS and in the solubilization of atmospheric iron.* (Feb. 2018).

Awards and Honors

1. Named by C&EN as one of 25 Chemists to follow on Twitter (2017): https://cen.acs.org/articles/95/web/2017/11/25-Chemists-should-follow-Twitter.html
2. Chemistry Department Nominee for "Outstanding Service Award" for the division of Natural Sciences & Mathematics (2015).
3. NSF Graduate Research Fellowship. Received $120,000 over 3 years. 2010–2013
4. Analytical chemistry student of the year. BYU 2007–2008
5. Female chemist of the year. BYU 2006–2007
6. Organic chemistry student of the year. BYU 2005–2006

Service (University of Denver)

1. **Chemistry Club Faculty Advisor** (Fall 2015–Present): Mentored as students organized outreach events (Englewood Public Library, DPS Science Fair, Vivian Elementary, etc.), professional development, and community building events such as trips to the nature and science museum.
2. **Undergraduate Curriculum Committee Member** DU (Fall 2015–Present). In Spring of 2016, I helped lead the assessment effort for the first-year chemistry courses.
3. Founding member of the **NSM teaching group** (Fall 2015–Present): Biweekly meetings focused on improving learning experience for our students.
4. **Public Good Committee** through CCESL (Spring 2019–Present).
5. **GTA Training** (Fall 2019 and Fall 2020): With Emily Barter, I co-designed and implemented the GTA training for incoming chemistry graduate students.
6. **Remote Teaching Consultant** (Spring 2020): Through the Office of Teaching and Learning, I held "office hours" for other faculty who needed support when redesigning their courses for a remote setting.
7. **Faculty Senate Substitute** (Fall 2019)**:** I attended Faculty Senate meetings in Fall 2019 for Michelle Knowles.
8. **Search Committee Member:** Teaching Assistant Professor (2 positions, Spring 2016).

Service (outside University of Denver)

1. **Public YouTube channel** (Fall 2014–Present)**:** ~70 short videos that I have created over the last 6 years to use in a variety of chemistry classes. These videos are published without ads for public consumption (Over 35K views since 2013): https://www.youtube.com/channel/UC4fWaRzSIyzLeB6KZ2e4cVg
2. **Public-facing Twitter Account** (January 2015–Present)**:** ~10K followers. Through this Twitter account, I share content including chemistry makeup looks, chemistry bullet journal spreads, and resources for both EPR spectroscopy and teaching chemistry.
3. **Science Ambassador Scholarship Advisory Board Member–Cards Against Humanity STEM scholarship for women** (Fall 2018–Present): Judged over 100 finalist applications in both 2019 and 2020.
4. **Reviewer for Journal of Chemistry Education** (Reviewed 10 publications since 2016)
5. **Reviewer for Environmental Science & Technology** (Reviewed 2 publications since 2020)
6. **Halloween Chemistry Demonstration Night, National Chemistry Week** (October, 2019): With the help of the Chemistry Club and faculty member Emily Barter, I put on a chemistry demonstration night at Vivian Elementary. The event was open to the public and was advertised at the public library, at local churches, and the neighborhood Facebook page. Over 150 people attended. This event was funded through a CCESL mini grant.
7. **Magic of Chemistry & the Anderson Academic Commons:** Together with the Writing Center, the Science and Engineering Center held an event for both DU students & the public. This event included chemistry demonstrations, Harry Potter trivia, and calligraphy/writing spells (October 2018). This event was also featured in Chemical & Engineering News: https://cen.acs.org/education/outreach/Chemists-recreate-Hogwarts-magic-mere/97/i41
8. **STEMosphere departmental representative** (September 2015): The chemistry department had a booth where we taught hundreds of learners of all ages about electrical conductivity through squishy circuits.

Selected Professional Development (Sept. 2015−2020)

1. **Hyflex Course Design Institute** through the Office of Teaching and Learning at DU (August, 2020).
2. Founding member of the **NSM teaching group**. Biweekly meetings focused on improving learning experience for our students (Fall 2015-- Current).
3. Attended the week-long **Course Design Institue (CDI)** through the Office of Teaching and Learning at DU (June, 2018).
4. Participated in **Student-Partnership program** through the Office of Teaching and Learning. A theater major came to my class, and we would meet 1x/week to discuss improvements for the class. (Winter 2018).
5. Attended **Service Learning Workshop** through the Center for Community Engagement and Service Learning (CCESL) (November 2017).
6. Attended **CCwCS mini workshop on Chemistry & Art** at BCCE given by Pat Hill, author of Creative Chemistry (August 2016).
7. **Peer observation group** (Fall 2015 & Winter 2016): Was paired with faculty in Math, Geography, Languages and Literature, and Engineering departments to observe and give feedback on classes.

Peer-reviewed Publications

Google Scholar Page: https://scholar.google.com/citations?hl=en&user=LDH8CYQAAAAJ

1. Runberg, H.L.; **Mitchell, D.G.** Eaton, S.S.; Eaton, G.R.; Majestic, B.J. Stability of environmentally persistent free radicals (EPFR) in atmospheric particulate matter and combustion particles. *Atmospheric Environment*. **2020.** 240, 117809.
2. Taczak, K.; **Mitchell, D. G.** Embracing the Ugly: Creating Generative Failure Through Bullet Journaling. *Failure Pedagogies: Systems, Risks, & Failures*. Ch 14, pp 201−224.**2020.** DOI: https://doi.org/10.3726/b16255

3. Schloemer, T.H.; Gehan, T.S.; Christians, J.A.; **Mitchell, D.G.;** Dixon, A.; Li, K.; Berry, J.J.; Luther, J.M.; Sellinger, A. Thermally Stable Perovskite Solar Cells by Systematic Molecular Design of the Hole-Transport Layer. *ACSEnergy Letters*. **2019,** 4, 473−482.
4. **Mitchell, D. G.;** Morris, J.A.; Meredith, J.M.; Bishop, N. Chemistry Infographics: Experimenting with Creativity and Information Literacy. *Liberal Arts Strategies for the Chemistry Classroom*. **January 1, 2017** , 113-131DOI:10.1021/bk-2017-1266.ch007
5. Biller, J.R.; **Mitchell, D.G.;** Tseytlin, M.; Elajaili, H.; Rinard, G.A.; Quine, R.W.; Eaton, S.S.; Eaton, G.R. Rapid-scan electron paramagnetic resonance opens new avenues for imaging physiologically important parameters *in vivo*. **2016**, Issue 116; **doi: 10.3791/54068**
6. Elajaili, H.; Rinard, G.A.; Yu, Z.; **Mitchell, D.G.;** Quine, R.W.; Eaton, S.S.; Eaton, G.R. Rapid-scan coherence signals in X-band EPR spectra of semiquinones with small hyperfine splittings. *Journal of Magnetic Resonance*. **2015**, 259, 20–23.
7. Biller, J.R.; Tseitlin, M.; **Mitchell**, **D. G.;** Yu, J.; Buchanan, L. A.; Elajaili, H.; Rosen, G. M.; Kao, J. P. Y.; Eaton, S. S. and G. R. Eaton, Improved Sensitivity for Imaging Spin Trapped Hydroxyl Radical at 250 MHz *ChemPhysChem*. **2015**, *16* (3), 528 – 531.
8. Eaton, S. S.; Quine, R.W.; Tseitlin, M.; **Mitchell, D.G.**; Rinard, G.A.; Eaton, G.R. Rapid-scan Electron Paramagnetic Resonance. *Multifrequency Electron Paramagnetic Resonance: Data & Techniques*. Ch 2, **2014.**
9. Kim, K.; Johnson, A.M.; Powell, A.L.; **Mitchell, D.G**.; and Sevy, E.T. High resolution IR diode laser study of collisional energy transfer between highly vibrationally excited monofluorobenzene and CO2: The effect of donor fluorination on strong collision energy transfer. *The Journal of Chemical Physics*. **2014,** *141*, 234306.
10. **Mitchell, D. G**., Rosen, G. M., Tseitlin, M., Symmes, B., Eaton, S. S., & Eaton, G. R. Use of Rapid-scan EPR to Improve Detection Sensitivity for Spin-Trapped Radicals. *Biophysical Journal*. **2013,** *105,* 338–342.
11. **Mitchell, D. G.**, Tseitlin, M., Quine, R. W., Meyer, V., Newton, M. E., Shnegg, A., et al. (2013). X-Band Rapid-scan EPR of Samples with Long Electron Relaxation Times: A Comparison of Continuous Wave, Pulse, and Rapid-scan EPR. *Mol. Phys., 111*, DOI: 10.1008/00268976.00262013.00792959
12. Plimpton, S.R.; Golkowski, M.; **Mitchell, D.G.**; Austin, C.; Eaton, S.S.; Eaton, G.R.; Golkowski, C.; Voskuil, M. Remote delivery of hydroxyl radicals via secondary chemistry of a nonthermal plasma effluent. *Biotechnology and Bioengineering,* **2013**, *110*, 1936–1944.DOI: 10.1002/bit.24853
13. Quine, R.W.; **Mitchell, D.G.**; Tseitlin, M.; Eaton, S.S.; Eaton, G.R., A Resonated Coil Driver for Rapid Scan EPR. *Magnetic Resonance Engineering*, **2012,** 4, 95–110.
14. Rajca, A.; Wang, Y.; Boska, M.; Paletta, J.; Olankitwanit, A.; Swanson, M.; **Mitchell, D.**; Eaton, S.; Eaton, G.; Rajca, S. Organic Radical Contrast Agents for Magnetic Resonance Imaging. *Journal of the American Chemical Society*. **2012***,* 134, 15724 – 15727.
15. Tseitlin, M.; **Mitchell, D.G**.; Eaton, S.S.; Eaton, G.R., Corrections for sinusoidal background and non-orthogonality of signal channels in sinusoidal rapid magnetic field scans. *Journal of Magnetic Resonance*. **2012**, 223, 80–84.
16. **Mitchell, D. G.**; Quine, R. W.; Tseitlin, M.; Eaton, S. S.; Eaton, G. R., X-band rapid-scan EPR of nitroxyl radicals. *Journal of Magnetic Resonance*. **2012**, 214, 221–226.
17. **Mitchell, D.G.**; Quine, R. W.; Tseitlin, M.; Weber, R.T.; Meyer, V.; Avery, A.; Eaton, S. S.; Eaton, G. R., Electron Spin Relaxation and Heterogeneity of the 1:1 α,γ-Bisdiphenylene-β-phenylallyl (BDPA): Benzene Complex. *Journal of Physical Chemistry B*. **2011**, 115, 7986–7990.
18. **Mitchell, D. G.**; Quine, R. W.; Tseitlin, M.; Meyer, V.; Eaton, S. S.; Eaton, G. R., Comparison of Continuous Wave, Spin Echo and Rapid Scan EPR of Irradiated Fused Quartz. *Radiation Measurements*. **2011**, 46, 993–996.
19. Quine, R.Q.; **Mitchell, D.G.**; Eaton, G.R., A General Purpose Q-Measuring Circuit Using Pulse Ring-Down. *Concepts in Magnetic Resonance B*. 2011, 39B, 43–46.
20. Eaton, G. R.; Eaton, S. S.; Quine, R. W.; **Mitchell, D.G.**; Kathirvelu, V.; Weber, R. T., A signal-to-noise standard for pulsed EPR. *J MagnReson***2010**, 205 (1), 109-113
21. **Mitchell, D.G.**; Johnson, J.A; Judd, K.A.; Mayhew, M.; Powell, A.L. Sevy, E.T. Collisional Relaxation of the Three Vibrationally Excited Difluorobenzene Isomers by Collisions with CO2: Effect of Donor Vibrational Mode *J. Phys. Chem. A*. **2008** 112 (6) 1157–1167

22. Johnson, J.A.; Kim, K.; Mayhew, M.; **Mitchell, D.G.**; Sevy, E.T. Rotationally Resolved IR-Diode Laser Studies of Ground-State CO2 Excited by Collisions with Vibrationally Excited Pyridine. *J. Phys. Chem. A.* **2008** 112 (12) 2543–255

Selected Presentations

1. **Mitchell, D.G.** Universal Design in First-year General Chemistry. Biennial Conference on Chemical Education, Lafayette, IN, July 31—Aug 4, **2022.**
2. **Mitchell, D.G.** Community-engaged learning in First-year General Chemistry. Biennial Conference on Chemical Education, Lafayette, IN, July 31—Aug 4, **2022.**
3. Mitchell, D.G. Lab Practical Demo: CW EPR of nitroxyl radicals. IES/SharedEPR Summer School on EPR Spectroscopy. Denver, CO, July 17-21, **2019**. (invited guest teacher).
4. **Mitchell, D.G.** Chemistry, Art, & Information Literacy. Biennial Conference on Chemical Education, South Bend, IN, July 29−Aug 2, **2018.**
5. **Mitchell, D.G.** Panel on Innovations in Classroom Teaching, CU Boulder Graduate Teacher Program Spring Conference. January 27th, **2018** (Invited talk)
6. **Mitchell, D. G.;** Morris, J.A.; Meredith, J.M.; Bishop, N.; Chemistry + Infographics. Exhibition of Student work located in AAC. Displayed from Fall 2016−Fall 2017.
7. **Mitchell, D.G.;** Morris, J.A., Bishop, N.; Meredith, J.; Huffman, J.A. Information Literacy & Infographics: Using infographics as a vehicle to teach information literacy. **2016** Biennial Conference on Chemical Education, Greeley, CO July 31-August 4.
8. **Mitchell, D.G.;** Morris, J.A., Bishop, N.; Meredith, J.; Huffman, J.A. Information Literacy & Infographics: Using infographics as a vehicle to teach information literacy. University of Denver Library Liason Group. April 20th, **2016**.
9. **Mitchell, D.G.** Chemistry & Art: Incorporating creative projects in the chemistry classroom. E learning Consortium of Colorado. May 27th, **2016** (Invited talk)
10. **Mitchell, D.G.** OTL Faculty showcase on a flipped chemistry classroom. Office of Teaching & Learning, University of Denver. September 23rd, **2015**.
11. **Mitchell, D.G.;** Tseitlin, M.; Newton, M.E.; Schengg, A.; George, B.; Quine, R.W.; Eaton, S.S. and Eaton, G.R., Rapid-scan EPR of Signals in Materials with Long Electron Spin Relaxation Times. 54th Rocky Mountain Conference on Analytical Chemistry, Copper Mountain, CO July 14-19 2012. (ORAL)
12. **Mitchell, D.G.;** Tseitlin, M.; Quine, R.W.; Meyer, V.; Eaton, S.S. and Eaton, G.R., X-band Rapid Scan EPR. The 242nd American Chemical Society National Meeting and Exposition, Denver, CO, August 28–September 1, 2011. (POSTER)
13. **Mitchell, D.G.;** Tseitlin, M.; Quine, R.W.; Meyer, V.; Eaton, S.S. and Eaton, G.R., X-band Rapid Scan EPR. 53rd Rocky Mountain Conference on Analytical Chemistry, Snowmass CO, July 24–28, 2011. (POSTER)
14. **Mitchell, D.G.;** Tseitlin, M.; Quine, R.W.; Meyer,V.; Eaton, S.S. and Eaton, G.R., X-band Rapid Scan EPR. 44th Annual International Meeting of the ESR Spectroscopy Group of the Royal Society of Chemistry, York, England, April 3–7, 2011. (ORAL)
15. **Mitchell, D.G.;** Tseitlin, M.; Quine, R.W.; Eaton, S.S. and Eaton, G.R., Applying X-band Rapid-scan EPR to Measure Short Relaxation Times. 52nd Rocky Mountain Conference on Analytical Chemistry, Snowmass CO, Aug 1–5, 2010. (POSTER)
16. **Mitchell, D.G.** Sevy, E.T. Vibrational Assignments of Benzene Derivatives. 54th Annual Western Spectroscopy Association Conference, Pacific Grove, CA, February 5–7, 2008. (POSTER)
17. **Mitchell, D.G.;** Sevy, E.T., Analysis of large energy transfers between vibrationally excited di-fluorobenzene and vibrationless CO_2 by IR spectroscopy. 232ndAmerican Chemical Society National Meeting, San Francisco, CA, September 10–14, 2007. (POSTER).