Martin R. McPhail

A. Professional Preparation

INSTITUTION	DISCIPLINE	DEGREE	YEAR
Missouri University of Science & Technology	Chemistry	B.S.	2010
Northwestern University	Physical Chemistry	Ph. D.	2015

B. Appointments

POSITION	INSTITUTION	PERIOD
Associate Professor of Chemistry	University of West Georgia	Aug 2022 - present
Assistant Professor of Chemistry	University of West Georgia	Aug 2015 – July 2022

C. Classes Taught

COURSE NUMBER	YEARS TAUGHT	COURSE DESCRIPTION
CHEM 1211L	2018, 2019	Accompanying laboratory course for Principles of Chemistry I; covers basic techniques and principles of heat, matter, and reactivity.; Core Area D class
CHEM 1212	2016 – 2023	Principles of Chemistry II; second semester of the general chemistry sequence detailing kinetics and equilibria phenomena; Core Area D class
CHEM 1212L	2015 - 2023	Accompanying laboratory course for Principles of Chemistry II; covers experiments involving kinetics, equilibria, and phase changes; Core Area D class
CHEM 2130	2020, 2022, 2023	A course designed to introduce Chemistry majors to current literature and career opportunities in Chemistry and allied fields.
CHEM 3550L	2015 – 2023	Physical Chemistry Lab; laboratory course for ACS-track chemistry majors with experiments in kinetics, thermodynamics, and quantum chemistry.
CHEM 4083	2016 – 2023	Faculty-Directed Undergraduate Research
CHEM 4585	2020	Advanced Topics in Physical Chemistry; principles of Atomic Force Microscopy as applied to physical characterization of nanomaterials are studied in conjunction with a student-developed research project
CHEM 4610	2015 - 2023	Inorganic Chemistry; requirement for all chemistry majors that develops the

		chemistry of inorganic compounds from chemical bonding models
CHEM 4985	2016, 2018, 2023	Materials Chemistry; elective for chemistry majors; combines lectures on modern materials chemistry with associated laboratory experiences and field trips to local industrial partners
XIDS 2002	2022, 2023	Materials that Make Our World; freshman Cornerstone course introducing students to concepts of materials and their economic, social, and environmental impacts

D. Products

(i) Publications

1. Milam, A.; Wasdin, P. T.; Turner, H.; Salyards, M. E.; Clay, A.; McPhail, M. R. Quantum dot thin film imaging enables *in situ*, benchtop analysis of ligand exchange at the solution-film interface. *Colloids Surf., A* **2021**, *629*, 127457. https://doi.org/10.1016/j.colsurfa.2021.127457
2. Salyards, M. E.; **McPhail, M. R.** Fluorescence quenching of CdSe quantum dots by para-substituted anilines: an undergraduate exploration of nanocrystal surface chemistry and photodynamics. *Chem. Educ.* **2020**, *25*, 119-128.
3. **McPhail, M. R**.; Campbell, G. P.; Bedzyk, M. J.; Weiss, E. A. Structural Features of PbS Nanocube Monolayers upon Treatment with Mono- and Dicarboxylic Acids and Thiols at a Liquid-Air Interface. *Langmuir* **2016**, *32*, 6666-6673. http://dx.doi.org/10.1021/acs.langmuir.6b01444
4. **McPhail, M. R.** Chemical Control of Lead Sulfide Quantum Dot Shape, Self-Assembly, and Charge Transport. Ph. D. Dissertation, Northwestern University, Evanston, IL, **2015**.
5. **McPhail, M. R**.; Weiss, E. A. Influence of Interparticle Structure on the Steady-State and Transient Current within Arrays of Thiocyanate-Treated PbS Nanocubes. *Chem. Mater.* **2015**, *27*, 5605-5613. http://dx.doi.org/10.1021/acs.chemmater.5b01861
6. **McPhail, M. R**.; Weiss, E. A. The Role of Organosulfur Compounds in the Growth and Final Surface Chemistry of PbS Quantum Dots. *Chem. Mater.* **2014**, *26*, 3377-3384, ACS Editor's Choice Article. http://dx.doi.org/10.1021/cm4040819
7. Knowles, K. E.; Peterson, M. D.; **McPhail, M. R**.; Weiss, E. A. Exciton Dissociation within Quantum Dot-Organic Complexes: Mechanisms, Use as a Probe of Interfacial Structure, and Applications. *J. Phys. Chem. C* **2013**, *117*, 10229-110243. http://dx.doi.org/10.1021/jp400699h
8. **McPhail, M. R**.; Sells, J. A.; He, Z.; Chusuei, C. C. Charging Nanowalls: Adjusting the Carbon Nanotube Isoelectric Point via Surface Functionalization. *J. Phys. Chem. C* **2009**, *113*, 14102-14109. http://dx.doi.org/10.1021/jp901439g
9. Tang, Y.; Guan, X.; Wang, J.; Gao, N.; **McPhail, M. R**.; Chusuei, C. C. Fluoride Adsorption Onto Granular Ferric Hydroxide: Effects of Ionic Strength, pH, Surface Loading, and Major Co-Existing Anions. *J. Hazard. Mater.* **2009**, *171*, 774. http://dx.doi.org/10.1016/j.jhazmat.2009.06.079

(ii) Oral Presentations

1. **McPhail, M. R.** Tracking quantum dot ligand exchange through macroscale thin film reorganization. 261st ACS National Meeting, April 5-6, **2021**.
2. **McPhail, M. R.** Addressing scientific literacy through scaffolded literature review in inorganic chemistry. 71st Southeastern Regional Meeting of the American Chemical Society, Savannah, GA, October 20-23, **2019**.
3. Wasdin, P.; **McPhail, M. R.** 1H-NMR investigation of displacement of oleate at PbS quantum dot surfaces using carboxylic acids, thiols, amines, and halides. 71st Southeastern Regional Meeting of the American Chemical Society, Savannah, GA, October 20-23, **2019.**
4. **McPhail, M. R.** Addressing scientific literacy through scaffolded literature review. 6th Annual Innovations in Pedagogy Conference, Carrollton, GA, May 14, **2019**.
5. Wasdin, P.; **McPhail, M. R.** Halide-oleate Ligand Equilibria of Solution-phase PbS Quantum Dots monitored by NMR Spectroscopy. 2nd World Congress on Undergraduate Research, Oldenburg, Germany, May 23-25, **2019**.
6. Salyards, M.; Wasdin, P.; **McPhail, M. R.** Halide-functionalization of lead sulfide quantum dot thin films at a liquid-air interface with quarternary ammonium salts. 70th Southeastern Regional Meeting of the American Chemical Society, Augusta, GA, October 31-November 3, **2018**.
7. Milam, A.; Salyards, M.; **McPhail, M. R.** Exchange of carboxylic acids, thiols, and amines in PbS quantum dot thin films at a liquid-air interface. 70th Southeastern Regional Meeting of the American Chemical Society, Augusta, GA, October 31-November 3, **2018**.
8. Nofs, Z.; Rogers, A.; Epps, V.; **McPhail, M. R.** Connecting silyl sulfide structure and reactivity to PbS quantum dot growth dynamics. 70th Southeastern Regional Meeting of the American Chemical Society, Augusta, GA, October 31-November 3, **2018**.
9. **McPhail, M. R.**; He, Z.; Sells, J. A.; Chusuei, C. C. Electrochemical Nitrosylation of Single-Walled Carbon Nanotubes. 238th ACS National Meeting, Washington D.C., United States, August 16-20, **2009**.
10. **McPhail, M. R.**; He, Z.; Chusuei, C. C. Varying the Carbon Nanotube Isoelectric Point Via Attachment of Surface Functional Groups. 82nd ACS Colloid and Surface Science Symposium, North Carolina State University, Raleigh, North Carolina, June 15-18, **2008**.

(iii) Posters

1. Miller, J.; **McPhail, M. R.** Self-assembly of acridine orange and cucurbit[n]urils: an atomic force microscopy study. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 4, **2023**.
2. Henley, M.; **McPhail, M. R.** Comparison of sulfur precursors for SnS nanocrystal preparation. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 4, **2023**.
3. Bernard, J.; Desormo, J.; **McPhail, M. R.** Effects of ligand environment on SnS nanocrystal growth. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 4, **2023**.
4. Hanham, A.; **McPhail, M. R.** Fluorescence of CdSe QDs: effects of halide and amine passivation. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 5, **2022**.

5. Turner, H.; **McPhail, M. R.** The production of ligand exchanged PbS QD monolayers for charge transport studies. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 6, **2021**.
6. Milam, A.; **McPhail, M. R.** Ligand exchange of PbS quantum dot thin films: Mechanism and kinetics. 71st Southeastern Regional Meeting of the American Chemical Society, Savannah, GA, October 20-23, **2019**.
7. Wasdin, P.; **McPhail, M. R.** Halide-oleate ligand equilibria of solution-phase PbS quantum dots monitored by NMR spectroscopy. 70th Southeastern Regional Meeting of the American Chemical Society, Augusta, GA, October 31-November 3, **2018**.
8. Milam, A.; Salyards, M.; **McPhail, M. R.** Effects of Ligand Binding Group and Length on the Displacement of Oleate and Subsequent Reorganization of Ultrathin Lead Sulfide Quantum Dot Films at a Liquid-Air Interface. 69th Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, November 7-11, **2017**.
9. Buth, V.; Nofs, Z.; **McPhail, M. R.** Mechanistic Insights into the Nucleation and Growth of Lead Sulfide Quantum Dots Using a Series of Silyl Sulfide Precursors. 69th Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, November 7-11, **2017**.
10. Milam, A.; **McPhail, M. R.** Tracking the Displacement of Oleate from PbS Quantum dot Thin Films by Simultaneous Video and NMR Analysis. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 14, **2017**.
11. Buth, V.; **McPhail, M. R.** Analysis of the Products of Silyl Sulfide and Lead(II) Oleate Reactions for Nucleating PbS Quantum Dots. University of West Georgia Undergraduate Research Conference, Carrollton, GA, April 14, **2017**.
12. Dorvilus, E.; Epps, V.; Lewis, M.; **McPhail, M. R.** Variation in the Growth Kinetics of Lead Sulfide Quantum Dots for a Series of Substituted Silanethiols. University of West Georgia Big Night, Carrollton, GA, April 13, **2016**.
13. Dorvilus, E.; Epps, V.; Lewis, M.; **McPhail, M. R.** Variation in the Growth Kinetics of Lead Sulfide Quantum Dots for a Series of Substituted Silanethiols. Georgia-Alabama Louis Stokes Alliance for Minority Participation Symposium, Clark Atlanta University, Atlanta, GA, April 16, **2016**.

(iv) External Grants

2023: **DOD DURIP** – "Sub-nanosecond Time-resolved Emission Spectrometer for Investigating Nanomaterials, Soft Materials and Self-assembled systems"; $403,619

2019: **NSF CAREER** – "Disorder in Lead Sulfide Quantum Dot Monolayers Following Ligand Exchange at a Liquid-Air Interface and its Effects on Charge Diffusion"; $580,651 **Declined**

2018: **NSF CAREER** – "Mechanistic Study of Metal Chalcogenide Quantum Dot Synthesis, Ligand-Directed Self-Assembly, and Thin Film Charge Transport"; $493,116 **Declined**

NSF MRI - "Acquisition of a time-resolved emission spectrometer for interdisciplinary research and undergraduate training"; $248,878 **Declined**

2017: **ACS PRF UNI** - "The Effects of Surface Chemistry on the Generation of Redox Equivalents in Lead Sulfide Quantum Dots for Heterogeneous Catalysis"; $55,000 **Funded**

(v) Internal Grants

2023: **SRAP** – “Elucidation of Precursor Conversion Reactions in SnS Nanocrystal Synthesis“; $1,550

Tech Fee – “Fourier Transform Infrared Spectrometer for Undergraduate Teaching and Research”; $40,370

2022: **SRAP** – “Development of a Synthetic Strategy for Small, Colloidal SnS Quantum Dots”; $1,204

2021: **SRAP** – “Effect of Halides on High-Pressure Fluorescence of Cadmium Selenide Quantum Dots”; $1,400

Tech Fee – “Purchase of an Edinburgh Instruments FS5 Steady State Fluorometer for Integration into Undergraduate Teaching and Research”; PI: John Hansen, Co-PIs: Farooq Khan & Martin McPhail; $30,800

2019: **SRAP** – “Dimethylammonium Halide Treatment of PbS QDs and Effects on Photocurrent Dynamics”; $1,570

COSM FRG – “Dimethylammonium Halide Treatment of PbS QDs and Effects on Photocurrent Dynamics”; $1,850

2017: **SRAP** - “New Strategies for Halide-Functionalized Lead Sulfide Quantum Dot Monolayers with High Packing Density”; $1,650

COSM FRG - “New Strategies for Halide-Functionalized Lead Sulfide Quantum Dot Monolayers with High Packing Density”; $1,500

2016: **SRAP** - “Analysis of Intermediates in the Synthesis of Lead Sulfide Quantum Dots”; $1,475

COSM FRG - “Effects of Binding Group, Ligand Length, and Concentration on Kinetics and Degree of Ligand Exchange at a Liquid-Air Interface”; $1,300

2015: **SRAP** - “Kinetics of Lead Sulfide Quantum Dot Nucleation and Growth”; $800

FRG - “Kinetics of Lead Sulfide Quantum Dot Nucleation and Growth”; $4,000

E. Synergistic Activities

1. Program Coordinator for Chemistry Program, 2023 - present
2. Faculty Advisor for ACS-certified B.S. in Chemistry students, 2016 – present
3. Internal Review Board Member, University of West Georgia, 2021 - present
4. Internal Review Board Member, Chapel Hill High School, 2017 - present
5. UWG Chemistry Association, Faculty Advisor, University of West Georgia, 2016 – present
6. Co-chair of Chemistry Scholarship Committee, 2021 - 2023
7. West Georgia Regional Science and Engineering Fair, Scientific Review Committee Member and Judge, University of West Georgia, 2016 – present
8. Mentored Holly Wallace during her first semester teaching Chem 1212L, 2021

9. Peer-reviewed manuscripts (*The Journal of Chemical Physics,* 2019; *Langmuir*, 2022) and grants (ACS PRF, 2019, 2022)
10. Panel Member for Phi Lambda Upsilon Alumni Careers Panel, Northwestern University, 2019
11. Review Board Member for UWG Faculty Research Grants, Spring 2018
12. Research affiliate with Georgia Tech Institute for Electronics and Nanotechnology, 2019 - present
13. Member of Grant Writing Group for NSF-CUR Transformations Project Grant, Spring 2017
14. Faculty Liaison to local industrial partners Southwire, Optical Fiber Solutions, and NClear, 2017
15. Attended NSF Early Career Grant Writing Workshop, March 20-21, 2017
16. Attended NSF RUI Grant Writing Workshop hosted by Georgia College & State University, October 14-16, 2016
17. UWG Student Research Assistant Program Supervisor: Victoria Buth (2016 - 2017), Adam Milam (2016 - 2017), Mary Salyards (2017-2018), Perry Wasdin (2019-2020), Michael Martin (2019-2020), Nicholas Schaefer (2021), Allison Hanham (2022), Juliet Bernard (2023), Jena Desormo (2023)
18. Sponsored Edelyn Dorvilus as a Louis-Stoke Alliance for Minority Participation Scholar in Undergraduate Research, University of West Georgia, 2016
19. Popular Nobel Lecture Series, Speaker, University of West Georgia, November 2016.
20. Demonstrator at STEM Outreach events held at the Carroll County Performing Arts Center (2021, 2023), Union Elementary (2019, 2020), and Adamson Square in Carrollton (2018, 2019).
21. Fostering Community Engagement via Booths at On-Campus Homecoming and Halloween Events, Coordinator and Demonstrator, University of West Georgia, 2016 – 2019
22. STEM Week for Regional Middle-School Students, Coordinator, University of West Georgia, 2016
23. Chemistry Day for Regional High School Students, Event Leader and Speaker, University of West Georgia, March 2016
24. Developed and implemented Excel-based laboratory exercises into the Principles of Chemistry II Laboratory (Chem 1212L) classroom, 2017
25. Developed and implemented new laboratory experiences into the Physical Chemistry Laboratory and Materials Chemistry courses including the synthesis and characterization of organometallic chromophores, construction of organic light emitting diodes, preparation and testing of liquid crystal polarizers, and the synthesis, functionalization, and spectroscopy of colloidal quantum dots. University of West Georgia, 2016
26. Faculty advisor for UWG Chemistry Majors on ACS-certified and General Degree Tracks, 2015-present
27. Developed and implemented hands-on learning activities for 3rd and 4th grade students at Hayt Elementary School in Chicago, IL through Northwestern University's Science in the Classroom initiative, 2013 – 2015

28. Materials Research, Science, and Engineering Center Fellow, Northwestern University, 2012 – 2015

29. Ryan Graduate Fellow, International Institute of Nanotechnology, Northwestern University, 2010 – 2012

F. Collaborators & Other Affiliations

(i) Professional Society Memberships

- American Chemical Society Member (2008 to present)
- Alpha Chi Sigma Professional Member (2008 to present)
- Interactive Online Network of Inorganic Chemists (2020 to present)

(ii) Collaborators and Co-Editors

- Gavin P. Campbell, Michael J. Bedzyk

(iii) Graduate Advisor and Postdoctoral Sponsors

- Professor Emily A. Weiss (Northwestern University), Ph. D. thesis advisor

(iv) Thesis Advisor and Postgraduate-Scholar Sponsor

- Undergraduate Students Advised in Faculty-Directed Research:
    - Advisees Currently Enrolled at UWG: Juliet Bernard, Jena Desormo, Allison Hanham, Jacob Miller
    - Advisees that Completed Thesis for ACS-Track B.S. Degree: Zachary Nofs (2018), Mary Salyards (2019), Adam Milam (2020), Perry Wasdin (2020), Michael Martin (2021)
    - Advisees that Graduated with B.S. in Chemistry without Thesis: Victoria Buth (2018; Secondary Education Track), Haley Turner (2021; General Track)
    - Non-Chemistry Majors that Performed Undergraduate Research: Mattea Lewis (Biology; 2016), Amanda Clay (Biology; 2019)
    - Advisees that Transferred Prior to B.S. Completion: Edelyn Dorvilus (Georgia Tech, 2016), Amberly Rogers (Georgia Tech, 2019), Nicholas Schaefer (Georgia Tech, 2021), Allison Hanham (Georgia Tech, 2022)
- Graduate students or postdoctoral fellows: None