

Matthew P. Grindle, PhD

NMR Scientist | Enhanced Oil Recovery Researcher

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PROFESSIONAL SUMMARY

Physical chemist and NMR spectroscopy specialist experienced across high-field and low-field magnetic resonance relaxometry. Currently a postdoctoral fellow at the National Energy Technology Laboratory (US DOE), developing high-pressure NMR and MRI methods for Enhanced Oil Recovery that quantify how CO₂, natural gas, water, surfactants, and field fluids move through real rock cores. Skilled in multiphase saturation, pore structure, wettability, and transport measurement, with a record of cross-disciplinary research, publication, mentoring, and laboratory instruction.

EDUCATION

- 2025** **PhD, Chemistry** | Miami University | Oxford, OH
Dissertation: Structural Dynamics of Inorganic Complexes and Chaperone Proteins Investigated Through NMR Spectroscopy and Molecular Dynamics
- 2016** **BS, Chemistry** | Purdue University | West Lafayette, IN

PROFESSIONAL EXPERIENCE

- 2025-Pres** **Postdoctoral Fellow (ORISE)** | National Energy Technology Laboratory (NETL) | Pittsburgh, PA
- Serve as the NMR subject-matter expert for petroleum, geologic materials, and subsurface-energy research.
 - Develop low-field NMR and MRI methods to quantify porosity, pore-size distributions, fluid saturation, wettability, and multiphase fluid movement in unconventional reservoir samples.
 - Design and conduct high-pressure enhanced oil recovery experiments using CO₂, natural gas, water, and surfactants, with emphasis on cyclic huff-and-puff recovery from shale and caprock.
 - Collaborate with NETL, university, and contractor researchers and communicate results through SPE and URTEC conference papers and presentations.
- 2019-2025** **Graduate Research Assistant** | Miami University | Oxford, OH
- Investigated transition-metal complexes and biomolecular systems using NMR, EPR, UV-vis spectroscopy, ICP analysis, X-ray diffraction, and computational modeling.
 - Integrated magnetic-resonance measurements with structural and molecular-dynamics methods to characterize electronic structure and molecular dynamics.
 - Mentored 6 undergraduate and 2 graduate researchers in spectroscopy, physical chemistry, data analysis, and laboratory methods.
 - Co-authored journal manuscripts and presented research at 7 scientific conferences.
- 2019-2024** **Teaching Assistant, General Chemistry** | Miami University | Oxford, OH
- Prepared lectures and laboratory instruction for classes of 20-100 students across five academic years.
 - Coordinated meetings and training for 20 teaching assistants as head teaching assistant to support consistent instruction and laboratory safety.
- 2017-2019** **Fermentation Associate** | DuPont Industrial Biosciences | Wilmington, DE
- Operated and supported 24 pilot fermenters for 14 L scale-up experiments in a continuous research environment.
 - Troubleshot Python-based controls and in-house data-tracking systems and coordinated with polymerization and separations laboratories.
- 2016-2017** **Analyst** | Bioanalytical Systems, Inc (BASi) | West Lafayette, IN
- Conducted GLP pharmaceutical analyses for quality control and stability studies; maintained and troubleshot 15 Agilent HPLC systems.
 - Developed five analytical standard operating procedures for future pharmaceutical studies.
- 2014-2016** **Microbiologist** | Tate & Lyle | West Lafayette, IN
- Performed microbiological and environmental monitoring for a corn starch and syrup manufacturing facility, including Listeria surveillance.
- 2014-2015** **Co-Op Chemist** | Chemtura Corporation | West Lafayette, IN
- Characterized bromine-based flame-retardant materials using NMR, HPLC, GPC, Karl Fischer titration, and related analytical methods.
 - Developed TEMPO-radical-based methods for preparing bisphenol-derived flame-retardant candidates.
- 2014** **Quality Management Intern** | Cargill | Hammond, IN
- Conducted chemical quality testing and designed experiments evaluating corn-syrup storage facilities and ion-exchange materials.

PUBLICATIONS AND CONFERENCE PROCEEDINGS

- 2026** **Comparing Huff-N-Puff Oil Recovery in Unconventional Shale Cores with CO₂ Alone Against Low Concentration Solution of 2EH-PO₅-EO₁₀ in CO₂ Using NMR Spectroscopy.** M. P. Grindle, D. Tapriyal, L. C. Burrows, R. Enick, and A. Goodman. *SPE Improved Oil Recovery Conference, Tulsa, Oklahoma, April 2026*. SPE-231513-MS; doi:10.2118/231513-MS
- 2026** **Enhanced Oil Recovery Effects of Adding Non-Ionic Surfactants During CO₂ Huff-and-Puff.** M. P. Grindle, D. Tapriyal, L. Burrows, and A. Goodman. *Unconventional Resources Technology Conference (URTeC), Houston, Texas, June 2026*
- 2024** **NMR Observation of Three Interconverting Structures in Tp^{Ph,Me} Cobalt (II) Nitrate.** M. P. Grindle, V. Batra, and D. L. Tierney. *European Journal of Chemistry*. submitted November 2024
- 2023** **Field- and Temperature-Dependent Paramagnetic Relaxation Enhancements in Co(II) Trispyrazolylmethanes.** N. D. Kumarage, A. R. Marts, M. P. Grindle, J. C. Kaine, L. A. Crandall, W.-Y. Chen, C. J. Ziegler, and D. L. Tierney. *Inorganic Chemistry*
- 2021** **Structural Communication between the E. coli Chaperones DnaK and Hsp90.** M. P. Grindle, B. Carter, J. P. Alao, K. Connors, R. Tehver, and A. N. Kravats. *International Journal of Molecular Sciences*

SELECTED PRESENTATIONS

- Jun 2026** **Enhanced Oil Recovery Effects of Adding Non-Ionic Surfactants During CO₂ Huff-and-Puff** | Unconventional Resources Technology Conference (URTeC), Houston, TX
- Nov 2023** **Solution NMR Magnetic Axis Direction of 4/5-Coordinate Co(II) Complexes** | Graduate Research Forum, Miami University, Oxford, OH
- Apr 2023** **NMR Relaxation Dynamics of 4/5-Coordinate Co (II) Complexes** | Experimental NMR Conference, Pacific Grove, CA
- Mar 2023** **Solution Dynamics of 4/5-Coordinate Cobalt Complexes** | American Chemical Society National Meeting, Indianapolis, IN
- Nov 2022** **Physical Electronic Dynamics in Five-Coordinate Cobalt (II)** | Ohio Inorganic Weekend, The Ohio State University, Columbus, OH
- Nov 2022** **Solution Dynamics of Co-Based Single-Ion Magnets** | Graduate Research Forum, Miami University, Oxford, OH
- Jan 2021** **Computational Modeling of the Modulation of Hsp70 by Hsp90** | Midwest Stress Response and Molecular Chaperones, Virtual
- Nov 2020** **Modeling the Modulation of Hsp90 by Hsp70** | Graduate Research Forum, Miami University, Oxford, OH

AWARDS AND LEADERSHIP

- 2026** **NETL National Laboratory Research SLAM Finalist** | US Department of Energy | Pittsburgh, PA
- 2022-2024** **Graduate Student Advocate** | Miami University Graduate School | Department of Chemistry and Biochemistry
- 2022-2023** **Outstanding Teaching Assistant** | Miami University Department of Chemistry and Biochemistry
- 2022** **Three-Minute Thesis Finalist** | Miami University Graduate School

SCIENCE OUTREACH

- 2026** **Western Pennsylvania Science Bowl** | Question Judge | National Energy Technology Laboratory
- Verified accurate pronunciation of technical and scientific terminology and corrected question delivery by moderators during live, timed competition rounds
 - Applied competition rules to contested reads under time pressure, ensuring consistent treatment of all teams
- 2023, 2024** **International Day of Light** | Presenter | Cincinnati Museum Center
- Delivered hands-on paper chromatography demonstrations to elementary school students, translating analytical separation concepts into age-appropriate, student-led experiment
- 2022-2024** **Talawanda Science Week** | Presenter | Miami University Department of Chemistry and Biochemistry
- Presented hands-on science labs (paper chromatography, pH measurement, red cabbage pH indicators) to ~300+ elementary students over 15–20 sessions during a week-long Talawanda Science Week program
- 2022, 2023** **Grandparents College** | Presenter | Miami University Department of Chemistry and Biochemistry
- Delivered chemistry laboratory demonstrations over multiple sessions during a two-day program, hosting middle school students and their grandparents in a working university lab
 - Tailored explanations for a mixed-age audience while maintaining lab safety for non-technical visitors