

Dr. John D. Kirtley

Associate Professor

Department of Chemistry and Geochemistry

Education:

B.S. Mathematics (Secondary Education), 2009

Minor Chemistry (Secondary Education), 2009

Ph.D. Chemistry, Montana State University, 2015

Work Experience:

Montana Tech Associate Professor (2023-present)

Montana Tech Assistant Professor (2019-2023)

Whitworth University Visiting Assistant Professor (2018-2019)

Washington State University Postdoctoral Research Associate (2016-2018)

US Naval Research Laboratory National Research Council Associate/Postdoc (2015-2016)

Honors and Awards:

Alumni Panelist, Office of Naval Research NURP review meeting (2023)

Rose and Anna Busch Faculty Achievement Award Nominee (2022, 2023)

National Research Council Research Associateship (2015)

Funded and Declined Grants:

Bullock, R.; Kirtley, J.; LaDouceur, R.; Brandl, R.; Klinger, J. On-site gasification of forest biomass utilizing carbon dioxide and earth-abundant catalysts for environmental remediation and advanced energy technologies. National Science Foundation EPSCoR RII Track-2 FEC, \$5,053,050, Submitted January 2023 (Status: Declined w/ opportunity to resubmit next cycle).

Kirtley, J. (team lead) and Skinner, J. Agile Manufacturing Methods Supporting Ceramic Fuel-Cell Development, CCDC-ARL, Year 3 of Task 7 of Cooperative Agreement W911NF-20-2-0163, \$183,000 (2022-present).

Kirtley, J. Agile Manufacturing Methods Supporting Ceramic Fuel-Cell Development, CCDC-ARL, Years 1 and 2 of Task 7 of Cooperative Agreement W911NF-20-2-0163, \$417,000 (2020-2022).

Kirtley, J. *In situ* Investigations of Advanced Armament Materials, CCDC-ARL, Years 5 and 6 of Task 11 of Cooperative Agreement W911NF-15-2-0020, \$230,000 (2019 – 2021)

Publications:

Hadi, A.S.; Morrow, F.; Kirtley, J.D. Examination of Morphological and Chemical Properties of Ni-BZY Anodes and Their Influence upon Methane Reactivity and Electrochemical Performance of Protonic Ceramic Fuel Cells. ECS Transactions, **2023**, 111(6):2171 (2023).

Pomeroy, E.D.; Steinhurst, D.; Tsoi, S.; Kirtley, J.D.; Eigenbrodt, B.; Owrutsky, J.; Maza, W.A.; Walker, R.A. Spatially Heterogeneous Chemistry Observed using NIRTI on SOFC Anodes. ECS Transactions, 111(6):1709 (2023).

- Muretta, J.E.; Prieto-Centurion, D.; LaDouceur, R.; and Kirtley, J.D., Unique Chemistry and Structure of Pyrolyzed Bovine Bone for Enhanced Aqueous Metals Adsorption, *Waste Biomass Valorization*, 14(3):703 (2022).
- Goettlich, D.; Hadi, A.; McEnaney, K.; and Kirtley, J., Investigations of Biochar as a Tunable Platform for Aqueous Malathion Adsorption and Decomposition, *MRS Advances*, 6(32):759 (2021).
- Kirtley, J.; Lechner, V.; Anderson, B.R.; and Eilers, H., A comparison of pulsed and continuous lasers for high-temperature Raman measurements of anhydrite, *J. Raman Spectrosc.*, 49(5):862 (2018).
- Kirtley, J.; Lechner, V.; and Eilers, H., Raman spectroscopy of oxygen carrier particles in harsh environments, *Proc. SPIE*, 10639 (2018).
- Kirtley, J.D.; Tsoi, S.; Qadri, S.N.; Steinhurst, D.A.; Walker, R.A.; and Owrutsky, J.C., In situ optical investigations of contaminants in operating solid oxide fuel cells, *ECS Trans*, 78:1261 (2017).
- Reeping, K.W.; Kirtley, J.D.; Bohn, J.M., Steinhurst, D.A., Owrutsky, J.C.; and Walker, R.A., Chlorine-Induced Degradation in Solid Oxide Fuel Cells Identified by Operando Optical Methods, *J. Phys. Chem. C*, 121(5):2588 (2017).
- Kirtley, J.D.; Qadri, S.N.; Steinhurst, D.A.; and Owrutsky, J.C., In operando, simultaneous observation of infrared molecular emission spectra and thermal images from solid oxide fuel cell electrodes, *J. Power Sources*, 336:54 (2016).
- Kirtley, J.D.; Pomfret, M.B.; Steinhurst, D.A.; Owrutsky, J.C.; and Walker, R.A., Toward a working mechanism of fuel oxidation in SOFCs: In situ optical studies of simulated biogas and methane, *J. Phys. Chem. C*, 119(23):12781 (2015).
- McIntyre, M.D.; Kirtley, J.D.; Singh, A.; Islam, S.; Hill, J. M.; and Walker, R.A., Comparing in situ carbon tolerances of Sn-infiltrated and BaO-infiltrated Ni-YSZ anodes in solid oxide fuel cells exposed to methane, *J. Phys. Chem. C*, 119(14):7637 (2015).
- Kirtley, J.D.; Pomfret, M.B.; Steinhurst, D.A.; Owrutsky, J.C.; and Walker, R.A., In operando optical studies of solid oxide fuel cells operating with butanol, *ECS Trans.*, 68(1):1091 (2015).
- Ladouceur, H.D.; Kirtley, J.D.; Qadri, S.N.; Owrutsky, J.C.; and Steinhurst, D.A., The effect of substrate on the spectral emission of a hot-gas overlayer. NRL/MR/6111—15-9663, (2015).
- Kirtley, J. D.; Steinhurst, D. A.; Owrutsky, J. C.; Pomfret, M. B.; and Walker, R. A., In situ optical studies of methane and simulated biogas oxidation on high temperature solid oxide fuel cell anodes, *Phys. Chem. Chem. Phys.*, 16:227 (2014).
- Reeping, K.W.; Halat, D.M.; Kirtley, J.D.; McIntyre, M.D.; and Walker, R.A., In situ optical and electrochemical studies of SOFC carbon tolerance. *ECS Trans.*, 61(1):57 (2014).
- Kirtley, J.; Singh, A.; Halat, D.; Oswell, T.; Hill, J. M.; and Walker, R. A., In situ Raman studies of carbon removal from high temperature Ni-YSZ cermet anodes by gas phase reforming agents, *J. Phys. Chem. C*, 117:25908 (2013).
- Kirtley, J.D.; McIntyre, M.D.; Halat, D.M.; and Walker, R.A., Insights into SOFC Ni/YSZ anode degradation using in situ Spectrochronopotentiometry. *ECS Trans.*, 50(44):3 (2013).
- Kirtley, J.D.; Halat, D.M.; McIntyre, M.D.; Eigenbrodt, B.C.; and Walker, R.A., High-Temperature ‘Spectrochronopotentiometry’: Correlating Electrochemical Performance with In Situ Raman Spectroscopy in Solid Oxide Fuel Cells, *Anal. Chem.*, 84(22): 9745 (2012).
- Kirtley, J.D.; Eigenbrodt, B.C.; and Walker, R.A., In situ optical studies of oxidation kinetics of Ni/YSZ cermet anodes, *ECS Trans.*, 33(40):25 (2011).
- Eigenbrodt, B.C.; Kirtley, J.D.; and Walker, R.A., In situ optical studies of solid oxide fuel cells operating with dry and humidified oxygenated fuels, *ECS Trans.*, 35(1):2789 (2011).

Service

Faculty Senate, Research Advisory Council, General Education Committee, numerous graduate committees, faculty club advisor for Chi Alpha, Montana Tech (2019-present).

Mentor for Undergraduate and graduate researchers (2016-present).

Occasional Manuscript Reviewer (~2017-present).