

Stanford



Tyler Mefford

Senior Physical Science Research Scientist

Materials Science and Engineering

 Curriculum Vitae available Online

Bio

BIO

Electrochemistry offers a clean pathway to reduce greenhouse gas emissions in manufacturing, chemical production, transportation, and to store excess energy from intermittent renewables like wind and solar. My research is focused on improving electrochemical energy storage and conversion technologies through rational material design. I develop new, higher performance electrodes and advanced techniques to study material structure-property relationships during operation. I am particularly interested in the functionality of transition metal oxides and polymeric electrodes in aqueous systems for use as battery electrodes and electrocatalysts for hydrogen production, oxygen reduction/evolution, CO₂ reduction, and ammonia production.

ACADEMIC APPOINTMENTS

- Sr Res Scientist-Physical, Materials Science and Engineering

HONORS AND AWARDS

- Best Presentation: In Situ/Operando Characterization of Energy Materials, Fall MRS Meeting, Materials Research Society (2020)
- Best Nano Portfolio Presentation, Center for Nano and Molecular Science, The University of Texas at Austin (2016)
- Certification In Nanoscience and Nanotechnology, Center for Nano and Molecular Science, The University of Texas at Austin (2016)
- First Prize in Research Excellence in Renewable & Clean Energy, The University of Texas at Austin (2016)

PROFESSIONAL EDUCATION

- Ph.D., The University of Texas at Austin , Chemistry (2016)
- B.S., Stanford University , Chemistry, Materials Science & Engineering (Minor) (2012)

Publications

PUBLICATIONS

- **Electrochemical ion insertion from the atomic to the device scale** *NATURE REVIEWS MATERIALS*
Sood, A., Poletayev, A. D., Cogswell, D. A., Csernica, P. M., Mefford, J., Fraggedakis, D., Toney, M. F., Lindenberg, A. M., Bazant, M. Z., Chueh, W. C.
2021
- **Correlative operando microscopy of oxygen evolution electrocatalysts.** *Nature*
Mefford, J. T., Akbashev, A. R., Kang, M., Bentley, C. L., Gent, W. E., Deng, H. D., Alsem, D. H., Yu, Y., Salmon, N. J., Shapiro, D. A., Unwin, P. R., Chueh, W. C.
2021; 593 (7857): 67–73
- **Tuning electrochemically driven surface transformation in atomically flat LaNiO₃ thin films for enhanced water electrolysis.** *Nature materials*
Baeumer, C., Li, J., Lu, Q., Liang, A. Y., Jin, L., Martins, H. P., Duchon, T., GloSS, M., Gericke, S. M., Wohlgenuth, M. A., Giesen, M., Penn, E. E., Dittmann, et al

2021

- **Energetic Control of Redox-Active Polymers toward Safe Organic Bioelectronic Materials.** *Advanced materials (Deerfield Beach, Fla.)*
Giovannitti, A., Rashid, R. B., Thiburce, Q., Paulsen, B. D., Cendra, C., Thorley, K., Moia, D., Mefford, J. T., Hanifi, D., Weiyuan, D., Moser, M., Salleo, A., Nelson, et al
2020: e1908047
- **Interpreting Tafel behavior of consecutive electrochemical reactions through combined thermodynamic and steady state microkinetic approaches** *ENERGY & ENVIRONMENTAL SCIENCE*
Mefford, J., Zhao, Z., Bajdich, M., Chueh, W. C.
2020; 13 (2): 622–34
- **Activation of ultrathin SrTiO₃ with subsurface SrRuO₃ for the oxygen evolution reaction** *ENERGY & ENVIRONMENTAL SCIENCE*
Akbashev, A. R., Zhang, L., Mefford, J. T., Park, J., Butz, B., Luftman, H., Chueh, W. C., Vojvodic, A.
2018; 11 (7): 1762–69
- **Water electrolysis on La_{1-x}Sr_xCoO_{3-δ} perovskite electrocatalysts** *NATURE COMMUNICATIONS*
Mefford, J., Rong, X., Abakumov, A. M., Hardin, W. G., Dai, S., Kolpak, A. M., Johnston, K. P., Stevenson, K. J.
2016; 7: 11053
- **Anion charge storage through oxygen intercalation in LaMnO₃ perovskite pseudocapacitor electrodes** *NATURE MATERIALS*
Mefford, J., Hardin, W. G., Dai, S., Johnston, K. P., Stevenson, K. J.
2014; 13 (7): 726–32
- **Reversible Electrochemical Charging of n-Type Conjugated Polymer Electrodes in Aqueous Electrolytes.** *Journal of the American Chemical Society*
Szumska, A. A., Maria, I. P., Flagg, L. Q., Savva, A., Surgailis, J., Paulsen, B. D., Moia, D., Chen, X., Griggs, S., Mefford, J. T., Rashid, R. B., Marks, A., Inal, et al
2021
- **Strong Catalyst-Support Interactions in Electrochemical Oxygen Evolution on Ni-Fe Layered Double Hydroxide** *ACS ENERGY LETTERS*
Gu, H., Shi, G., Chen, H., Xie, S., Li, Y., Tong, H., Yang, C., Zhu, C., Mefford, J., Xia, H., Chueh, W. C., Chen, H., Zhang, et al
2020; 5 (10): 3185–94
- **Electrochemical Reactivity of Faceted beta-Co(OH)₂ Single Crystal Platelet Particles in Alkaline Electrolytes** *JOURNAL OF PHYSICAL CHEMISTRY C*
Mefford, J., Akbashev, A. R., Zhang, L., Chueh, W. C.
2019; 123 (31): 18783–94
- **Decoupling the roles of carbon and metal oxides on the electrocatalytic reduction of oxygen on La_{1-x}Sr_xCoO_{3-δ} perovskite composite electrodes** *PHYSICAL CHEMISTRY CHEMICAL PHYSICS*
Mefford, J., Kurilovich, A. A., Saunders, J., Hardin, W. G., Abakumov, A. M., Forslund, R. P., Bonnefont, A., Dai, S., Johnston, K. P., Stevenson, K. J.
2019; 21 (6): 3327–38
- **Anion-Based Pseudocapacitance of the Perovskite Library La_{1-x}Sr_xBO_{3-δ} (B = Fe, Mn, Co)** *ACS APPLIED MATERIALS & INTERFACES*
Alexander, C. T., Mefford, J., Saunders, J., Forslund, R. P., Johnston, K. P., Stevenson, K. J.
2019; 11 (5): 5084–94
- **Bifunctional OER/ORR catalytic activity in the tetrahedral YBaCo₄O_{7.3} oxide** *JOURNAL OF MATERIALS CHEMISTRY A*
Kirsanova, M. A., Okatenko, V. D., Aksyonov, D. A., Forslund, R. P., Mefford, J., Stevenson, K. J., Abakumov, A. M.
2019; 7 (1): 330–41
- **Exceptional electrocatalytic oxygen evolution via tunable charge transfer interactions in La_{0.5}Sr_{1.5}Ni_{1-x}Fe_xO_{4±δ} Ruddlesden-Popper oxides.** *Nature communications*
Forslund, R. P., Hardin, W. G., Rong, X., Abakumov, A. M., Filimonov, D., Alexander, C. T., Mefford, J. T., Iyer, H., Kolpak, A. M., Johnston, K. P., Stevenson, K. J.
2018; 9 (1): 3150
- **Synthesis and charge storage properties of templated LaMnO₃-SiO₂ composite materials** *DALTON TRANSACTIONS*
Piburn, G. W., Mefford, J., Zinni, N., Stevenson, K. J., Humphrey, S. M.
2017; 46 (3): 977–84
- **Nanostructured LaNiO₃ Perovskite Electrocatalyst for Enhanced Urea Oxidation** *ACS CATALYSIS*

Forslund, R. P., Mefford, J., Hardin, W. G., Alexander, C. T., Johnston, K. P., Stevenson, K. J.
2016; 6 (8): 5044–51

● **Tuning the Electrocatalytic Activity of Perovskites through Active Site Variation and Support Interactions** *CHEMISTRY OF MATERIALS*

Hardin, W. G., Mefford, J., Slanac, D. A., Patel, B. B., Wang, X., Dai, S., Zhao, X., Ruoff, R. S., Johnston, K. P., Stevenson, K. J.
2014; 26 (11): 3368–76

● **An ultrafast nickel-iron battery from strongly coupled inorganic nanoparticle/nanocarbon hybrid materials** *NATURE COMMUNICATIONS*

Wang, H., Liang, Y., Gong, M., Li, Y., Chang, W., Mefford, T., Zhou, J., Wang, J., Regier, T., Wei, F., Dai, H.
2012; 3

● **Improved Diabetes Control and Pancreatic Function in a Type 2 Diabetic after Omeprazole Administration** *CASE REPORTS IN ENDOCRINOLOGY*

Mefford, I. N., Mefford, J. T., Burris, C. A.
2012; 2012: 468609