CHRISTOPHER A. GORSKI

Associate Professor of Civil & Environmental Engineering

Pennsylvania State University 286 Engineering Collaborative Research and Education (ECoRE) building 556 White Course Dr. University Park, PA 16802-1408 email: gorski@psu.edu

PROFESSIONAL PREPARATION

Purdue University	Civil Engineering	B.S., 2005
University of Iowa	Environmental Engineering & Science	Ph.D., 2009
Eawag (Switzerland)	Environmental Chemistry	Post-doc, 2010-2012

APPOINTMENTS

08/2019 – present	Associate Professor, Department of Civil & Environmental Engineering,
	Pennsylvania State University, University Park, PA
08/2012 - 07/2019	Assistant Professor, Department of Civil & Environmental Engineering,
	Pennsylvania State University, University Park, PA

JOURNAL PUBLICATIONS

- 1. Gorski C. A., Scherer M. M. (2009). Influence of magnetite stoichiometry on Fe^{II} uptake and nitrobenzene reduction. *Environmental Science & Technology*, 43(10):3675–3680.
- 2. Gorski C. A., Nurmi J. T., Tratnyek P. G., Hofstetter T. B., Scherer M. M. (2010). Redox behavior of magnetite: Implications for contaminant reduction. *Environmental Science & Technology*, 44(1):55–60.
- Gorski C. A., Scherer M. M. (2010). Determination of nanoparticulate magnetite stoichiometry by Mossbauer spectroscopy, acidic dissolution, and powder X-ray diffraction: A critical review. *American Mineralogist*, 95(7):1017–1026.
- O'Loughlin E. J., Gorski C. A., Scherer M. M., Boyanov M. I., Kemner K. M. (2010). Effects of oxyanions, natural organic matter, and bacterial cell numbers on the bioreduction of lepidocrocite (γ-FeOOH) and the formation of secondary mineralization products. *Environmental Science & Technology*, 44(12):4570– 4576.
- Rosso K. M., Yanina S. V., Gorski C. A., Larese-Casanova P., Scherer M. M. (2010). Connecting observations of hematite (α-Fe₂O₃) growth catalyzed by Fe(II). *Environmental Science & Technology*, 44(1):61–67.
- 6. Gorski C. A., Sander M., Aeschbacher M., Hofstetter T. B. (2011). Assessing the redox properties of iron-bearing clay minerals using homogeneous electrocatalysis. *Applied Geochemistry*, 26:S191–S193.

- 7. Schaefer M. V., Gorski C. A., Scherer M. M. (2011). Spectroscopic evidence for interfacial Fe(II)-Fe(III) electron transfer in a clay mineral. *Environmental Science & Technology*, 45(2):540–545.
- 8. Chen H., Laskin A., Baltrusaitis J., Gorski C. A., Scherer M. M., Grassian V. H. (2012). Coal fly ash as a source of iron in atmospheric dust. *Environmental Science & Technology*, 46(4):2112–2120.
- Gorski C. A., Aeschbacher M., Soltermann D., Voegelin A., Baeyens B., Marques Fernandes M., Hofstetter T. B., Sander M. (2012). Redox properties of structural Fe in clay minerals. 1. Electrochemical quantification of electron-donating and-accepting capacities of smectites. *Environmental Science & Technology*, 46(17):9360–9368.
- Gorski C. A., Handler R. M., Beard B. L., Pasakarnis T., Johnson C. M., Scherer M. M. (2012). Fe atom exchange between aqueous Fe²⁺ and magnetite. *Environmental Science & Technology*, 46(22):12399– 12407.
- Gorski C. A., Klüpfel L., Voegelin A., Sander M., Hofstetter T. B. (2012). Redox properties of structural Fe in clay minerals. 2. Electrochemical and spectroscopic characterization of electron transfer irreversibility in ferruginous smectite, SWa-1. *Environmental Science & Technology*, 46(17):9369–9377.
- Latta D. E., Gorski C. A., Boyanov M. I., O'Loughlin E. J., Kemner K. M., Scherer M. M. (2012). Influence of magnetite stoichiometry on U^{v1} reduction. *Environmental Science & Technology*, 46(2):778–786.
- 13. Latta D. E., Gorski C. A., Scherer M. M. (2012). Influence of Fe²⁺-catalyzed iron oxide recrystallization on metal cycling. *Biochemical Society Transactions*, 40(6):1191–1197.
- 14. Lilova K. I., Pearce C. I., Gorski C., Rosso K. M., Navrotsky A. (2012). Thermodynamics of the magnetite-ulvöspinel (Fe₃O₄-Fe₂TiO₄) solid solution. *American Mineralogist*, 97(8–9):1330–1338.
- Pearce C. I., Qafoku O., Liu J., Arenholz E., Heald S. M., Kukkadapu R. K., Gorski C. A., Henderson C. M. B., Rosso K. M. (2012). Synthesis and properties of titanomagnetite (Fe_{3-x}TixO₄) nanoparticles: A tunable solid-state Fe(II/III) redox system. *Journal of Colloid and Interface Science*, 387(1):24–38.
- Gorski C. A., Klüpfel L. E., Voegelin A., Sander M., Hofstetter T. B. (2013). Redox properties of structural Fe in clay minerals: 3. Relationships between smectite redox and structural properties. *Environmental Science & Technology*, 47(23):13477–13485.
- O'Loughlin E. J., Boyanov M. I., Flynn T. M., Gorski C. A., Hofmann S. M., McCormick M. L., Scherer M. M., Kemner K. M. (2013). Effects of bound phosphate on the bioreduction of lepidocrocite (γ-FeOOH) and maghemite (γ-Fe₂O₃) and formation of secondary minerals. *Environmental Science & Technology*, 47(16):9157–9166.
- 18. Luan F., Gorski C. A., Burgos W. D. (2014). Thermodynamic controls on the microbial reduction of iron-bearing nontronite and uranium. *Environmental Science & Technology*, 48(5):2750–2758.
- Soltermann D., Marques Fernandes M., Baeyens B., Dähn R., Joshi P. A., Scheinost A. C., Gorski C. A. (2014). Fe(II) uptake on natural montmorillonites. I. Macroscopic and spectroscopic characterization. *Environmental Science & Technology*, 48(15):8688–8697.

- 20. Luan F., Gorski C. A., Burgos W. D. (2015). Linear free energy relationships for the biotic and abiotic reduction of nitroaromatic compounds. *Environmental Science & Technology*, 49(6):3557–3565.
- 21. Luan F., Liu Y., Griffin A. M., Gorski C. A., Burgos W. D. (2015). Iron (III)-bearing clay minerals enhance bioreduction of nitrobenzene by Shewanella putrefaciens CN32. *Environmental Science & Technology*, 49(3):1418–1426.
- Sander M., Hofstetter T. B., Gorski C. A. (2015). Electrochemical analyses of redox-active iron minerals: A review of nonmediated and mediated approaches. *Environmental Science & Technology*, 49(10):5862–5878.
- Gorski C. A., Edwards R., Sander M., Hofstetter T. B., Stewart S. M. (2016). Thermodynamic characterization of iron oxide–aqueous Fe²⁺ redox couples. *Environmental Science & Technology*, 50(16):8538–8547.
- 24. Joshi P., Gorski C. A. (2016). Anisotropic morphological changes in goethite during Fe²⁺-catalyzed recrystallization. *Environmental Science & Technology*, 50(14):7315–7324.
- Kar A., McEldrew M., Stout R. F., Mays B. E., Khair A., Velegol D., Gorski C. A. (2016). Self-generated electrokinetic fluid flows during pseudomorphic mineral replacement reactions. *Langmuir*, 32(21):5233–5240.
- Kim T., Rahimi M., Logan B. E., Gorski C. A. (2016). Evaluating battery-like reactions to harvest energy from salinity differences using ammonium bicarbonate salt solutions. *ChemSusChem*, 9(9):981– 988.
- Kim T., Rahimi M., Logan B. E., Gorski C. A. (2016). Harvesting energy from salinity differences using battery electrodes in a concentration flow cell. *Environmental Science & Technology*, 50(17):9791– 9797.
- Tomaszewski E. J., Cronk S. S., Gorski C. A., Ginder-Vogel M. (2016). The role of dissolved Fe (II) concentration in the mineralogical evolution of Fe (hydr)oxides during redox cycling. *Chemical Geology*, 438:163–170.
- Wu T., Kukkadapu R. K., Griffin A. M., Gorski C. A., Konishi H., Xu H., Roden E. E. (2016). Interactions between Fe (III)-oxides and Fe (III)-phyllosilicates during microbial reduction 1: Synthetic sediments. *Geomicrobiology Journal*, 33(9):793–806.
- 30. Zhu X., Rahimi M., Gorski C. A., Logan B. (2016). A thermally-regenerative ammonia-based flow battery for electrical energy recovery from waste heat. *ChemSusChem*, 9(8):873–879.
- 31. Gorski C. A., Fantle M. S. (2017). Stable mineral recrystallization in low temperature aqueous systems: A critical review. *Geochimica et Cosmochimica Acta*, 198:439–465.
- 32. Joshi P., Fantle M. S., Larese-Casanova P., Gorski C. A. (2017). Susceptibility of goethite to Fe²⁺ catalyzed recrystallization over time. *Environmental Science & Technology*, 51(20):11681–11691.
- 33. Kim T., Gorski C. A., Logan B. E. (2017). Low energy desalination using battery electrode deionization. *Environmental Science & Technology Letters*, 4(10):444–449.
- 34. Kim T., Logan B. E., Gorski C. A. (2017). A pH-gradient flow cell for converting waste CO₂ into electricity. *Environmental Science & Technology Letters*, 4(2):49–53.

- 35. Kim T., Logan B. E., Gorski C. A. (2017). High power densities created from salinity differences by combining electrode and Donnan potentials in a concentration flow cell. *Energy & Environmental Science*, 10(4):1003–1012.
- Rahimi M., D'Angelo A., Gorski C. A., Scialdone O., Logan B. E. (2017). Electrical power production from low-grade waste heat using a thermally regenerative ethylenediamine battery. *Journal of Power Sources*, 351:45–50.
- 37. Rahimi M., Schoener Z., Zhu X., Zhang F., Gorski C. A., Logan B. E. (2017). Removal of copper from water using a thermally regenerative electrodeposition battery. *Journal of Hazardous Materials*, 322:551–556.
- Rahimi M., Zhu L., Kowalski K. L., Zhu X., Gorski C. A., Hickner M. A., Logan B. E. (2017). Improved electrical power production of thermally regenerative batteries using a poly (phenylene oxide) based anion exchange membrane. *Journal of Power Sources*, 342:956–963.
- Schaefer M. V., Guo X., Gan Y., Benner S. G., Griffin A. M., Gorski C. A., Wang Y., Fendorf S. (2017). Redox controls on arsenic enrichment and release from aquifer sediments in central Yangtze River Basin. *Geochimica et Cosmochimica Acta*, 204:104–119.
- 40. Wu T., Griffin A., Gorski C., Shelobolina E., Xu H., Kukkadapu R., Roden E. (2017). Interactions between Fe (III)-oxides and Fe (III)-phyllosilicates during microbial reduction 2: Natural subsurface sediments. *Geomicrobiology Journal*, 34(3):231–241.
- 41. Zhu X., Kim T., Rahimi M., Gorski C. A., Logan B. E. (2017). Integrating reverse-electrodialysis stacks with flow batteries for improved energy recovery from salinity gradients and energy storage. *ChemSusChem*, 10(4):797–803.
- Aeppli M., Voegelin A., Gorski C. A., Hofstetter T. B., Sander M. (2018). Mediated electrochemical reduction of iron (oxyhydr-)oxides under defined thermodynamic boundary conditions. *Environmental Science & Technology*, 52(2):560–570.
- 43. Kim T., Gorski C. A., Logan B. E. (2018). Ammonium removal from domestic wastewater using selective battery electrodes. *Environmental Science & Technology Letters*, 5(9):578–583.
- 44. Rahimi M., Kim T., Gorski C. A., Logan B. E. (2018). A thermally regenerative ammonia battery with carbon-silver electrodes for converting low-grade waste heat to electricity. *Journal of Power Sources*, 373:95–102.
- 45. Rahimi M., Straub A. P., Zhang F., Zhu X., Elimelech M., Gorski C. A., Logan B. E. (2018). Emerging electrochemical and membrane-based systems to convert low-grade heat to electricity. *Energy & Environmental Science*, 11(2):276–285.
- 46. Stewart S. M., Hofstetter T. B., Joshi P., Gorski C. A. (2018). Linking thermodynamics to pollutant reduction kinetics by Fe2+ bound to iron oxides. *Environmental Science & Technology*, 52(10):5600–5609.
- Xiong B., Miller Z., Roman-White S., Tasker T., Farina B., Piechowicz B., Burgos W. D., Joshi P., Zhu L., Gorski C. A., et al. (2018). Chemical degradation of polyacrylamide during hydraulic fracturing. *Environmental Science & Technology*, 52(1):327–336.

- 48. Yan Z., Joshi P., Gorski C. A., Ferry J. G. (2018). A biochemical framework for anaerobic oxidation of methane driven by Fe (III)-dependent respiration. *Nature Communications*, 9(1):1642.
- 49. Chanda P., Gorski C. A., Oakes R. L., Fantle M. S. (2019). Low temperature stable mineral recrystallization of foraminiferal tests and implications for the fidelity of geochemical proxies. *Earth and Planetary Science Letters*, 506:428–440.
- Harouaka K., Gorski C. A., Fantle M. S. (2019). Quantifying Ca exchange in gypsum using a ⁴⁵Ca tracer: Implications for interpreting Ca isotopic effects in experimental and natural systems. *Geochimica et Cosmochimica Acta*, 259:371–390.
- O'Loughlin E. J., Gorski C. A., Flynn T. M., Scherer M. M. (2019). Electron donor utilization and secondary mineral formation during the bioreduction of lepidocrocite by Shewanella putrefaciens CN32. *Minerals*, 9(7):434.
- 52. Son M., Kim T., Yang W., Gorski C. A., Logan B. E. (2019). Electro-forward osmosis. *Environmental Science & Technology*, 53(14):8352–8361.
- Chen G., Hofstetter T. B., Gorski C. A. (2020). Role of carbonate in thermodynamic relationships describing pollutant reduction kinetics by iron oxide-bound Fe²⁺. *Environmental Science & Technology*, 54(16):10109–10117.
- Fortunato J., Peña J., Benkaddour S., Zhang H., Huang J., Zhu M., Logan B. E., Gorski C. A. (2020). Surveying manganese oxides as electrode materials for harnessing salinity gradient energy. *Environmental Science & Technology*, 54(9):5746–5754.
- Huang W., Komarneni S., Gorski C., Noh Y. D., Doroski A., Dong Y., Ma J., Griffin A. M., Yang D., Xue X., et al. (2020). Few-layer clayenes for material and environmental applications. ACS Applied Materials & Interfaces, 12(9):11171–11179.
- Pothanamkandathil V., Fortunato J., Gorski C. A. (2020). Electrochemical desalination using intercalating electrode materials: A comparison of energy demands. *Environmental Science & Technology*, 54(6):3653–3662.
- 57. Shi L., Rossi R., Son M., Hall D. M., Hickner M. A., Gorski C. A., Logan B. E. (2020). Using reverse osmosis membranes to control ion transport during water electrolysis. *Energy & Environmental Science*, 13(9):3138–3148.
- Son M., Aronson B. L., Yang W., Gorski C. A., Logan B. E. (2020). Recovery of ammonium and phosphate using battery deionization in a background electrolyte. *Environmental Science: Water Research & Technology*, 6(6):1688–1696.
- Son M., Kolvek E., Kim T., Yang W., Vrouwenvelder J. S., Gorski C. A., Logan B. E. (2020). Stepwise ammonium enrichment using selective battery electrodes. *Environmental Science: Water Research & Technology*, 6(6):1649–1657.
- Son M., Pothanamkandathil V., Yang W., Vrouwenvelder J. S., Gorski C. A., Logan B. E. (2020). Improving the thermodynamic energy efficiency of battery electrode deionization using flow-through electrodes. *Environmental Science & Technology*, 54(6):3628–3635.

- 61. Boualavong J., Gorski C. A. (2021). Electrochemically mediated CO₂ capture using aqueous Cu(II)/Cu(I) imidazole complexes. *ACS ES&T Engineering*, 1(7):1084–1093.
- 62. Cheng Y., Hall D. M., Boualavong J., Hickey R. J., Lvov S. N., Gorski C. A. (2021). Influence of hydrotropes on the solubilities and diffusivities of redox-active organic compounds for aqueous flow batteries. *ACS Omega*, 6(45):30800–30810.
- 63. Fortunato J., Sassin M. B., Chervin C. N., Parker J. F., DeBlock R. H., Gorski C. A., Long J. W. (2021). Optimizing electrodeposited manganese oxide at carbon cloth electrodes for harvesting salinitygradient energy. *Journal of The Electrochemical Society*, 168(2):024505.
- 64. O'Loughlin E. J., Boyanov M. I., Gorski C. A., Scherer M. M., Kemner K. M. (2021). Effects of Fe (III) oxide mineralogy and phosphate on Fe (II) secondary mineral formation during microbial iron reduction. *Minerals*, 11(2):149.
- Rossi R., Hall D. M., Shi L., Cross N. R., Gorski C. A., Hickner M. A., Logan B. E. (2021). Using a vapor-fed anode and saline catholyte to manage ion transport in a proton exchange membrane electrolyzer. *Energy & Environmental Science*, 14(11):6041–6049.
- 66. Shi L., Newcomer E., Son M., Pothanamkandathil V., Gorski C. A., Galal A., Logan B. E. (2021). Metalion depletion impacts the stability and performance of battery electrode deionization over multiple cycles. *Environmental Science & Technology*, 55(8):5412–5421.
- 67. Springer R., Cross N. R., Lvov S. N., Logan B. E., Gorski C. A., Hall D. M. (2021). An all-aqueous thermally regenerative ammonia battery chemistry using Cu (I, II) redox reactions. *Journal of The Electrochemical Society*, 168(7):070523.
- Chen G., Thompson A., Gorski C. A. (2022). Disentangling the size-dependent redox reactivity of iron oxides using thermodynamic relationships. *Proceedings of the National Academy of Sciences*, 119(40): e2204673119
- 69. Cross N. R., Rau M. J., Lvov S. N., Gorski C. A., Logan B. E., Hall D. M. (2022). Power and energy capacity tradeoffs in an all-aqueous copper thermally regenerative ammonia battery. *Journal of Power Sources*, 531:231339.
- Ganesan A., Zimudzi T. J., Pothanamkandathil V., Gorski C. A., Hall D. M. (2022). Spectroelectrochemical examination of the ferro-ferricyanide redox reaction: Impacts of electrode thickness and applied potential. *Journal of The Electrochemical Society*, 169(10):106501.
- 71. Joshi P., Fantle M. S., Boualavong J., Gorski C. A. (2022). Quantifying the rate of Fe²⁺-catalyzed recrystallization based on a unifying model framework. *Geochimica et Cosmochimica Acta*, 336:423–435.
- 72. Pothanamkandathil V., Gorski C. A. (2022). Comparing energy demands and longevities of membrane-based capacitive deionization architectures. *Environmental Science: Water Research & Technology*, 8(7):1489–1496.
- 73. Shi L., Bi X., Newcomer E., Hall D. M., Gorski C. A., Galal A., Logan B. E. (2022). Co-precipitation synthesis control for sodium ion adsorption capacity and cycle life of copper hexacyanoferrate electrodes in battery electrode deionization. *Chemical Engineering Journal*, 435:135001.

- 74. Shi L., Bi X., Newcomer E., Hall D. M., Gorski C. A., Logan B. E. (2022). Thermodynamic and kinetic analyses of ion intercalation/deintercalation using different temperatures on NiHCF electrodes for battery electrode deionization. *Environmental Science & Technology*, 56(12):8932–8941.
- 75. Boualavong J., Papakonstantinou K. G., Gorski C. A. (2023). Determining desired sorbent properties for proton-coupled electron transfer-controlled CO₂ capture using an adaptive sampling-refined classifier. *Chemical Engineering Science*, 274:118673.
- Cross N. R., Rau M. J., Lvov S. N., Gorski C. A., Logan B. E., Hall D. M. (2023). System efficiency and power assessment of the all-aqueous copper thermally regenerative ammonia battery. *Applied Energy*, 339:120959.
- 77. Cross N. R., Vazquez-Sanchez H., Rau M. J., Lvov S. N., Hickner M. A., Gorski C. A., Nagaraja S. S., Sarathy S. M., Logan B. E., Hall D. M. (2023). Hydrocarbon-based membranes cost-effectively manage species transport and increase performance in thermally regenerative batteries. *Electrochimica Acta*, 446:143090.
- 78. Chen G., Thompson A., Gorski C. A. (2023). The pH-dependent interplay of surface energy and aggregation state for nanoparticulate goethite. *ACS Earth and Space Chemistry*, 7(11):2166-2175.
- 79. Pothanamkandathil V., Boualavong J., Gorski C. A. (2023). Open-circuit potential drift in intercalation electrodes: Role of charge redistribution in a Prussian Blue analog. *Journal of The Electrochemical Society*, 170(11):110503.
- 80. Boualavong J., Gorski C. A. (2023). Kinetic drawbacks of combining electrochemical CO₂ sorbent reactivation with CO₂ absorption. *Industrial & Engineering Chemistry Research*, 62(46):19784-19800.
- Shi L., Zhou X., Taylor R. F., Cie C., Bian B., Hall D. M., Rossi R., Hickner M. A., Gorski C. A., Logan B. E. (2024). Thin-film composite membranes for hydrogen evolution with a saline catholyte water feed. *Environmental Science & Technology*, 58(2):1131-1141.
- 82. Cross N. R., Rau M. J., Gorski C. A., Logan B. E., Hall D. M. (2024). Simulating discharge curves of an all-aqueous TRAB to identify pathways for improving system performance. *Journal of The Electrochemical Society*, 171:040547.
- 83. Hudak T. C., Gorski C. A., Arges C. G. (2024). A redox-electrodialysis model with zero fitting parameters: Insights into process limitations, design, and material interventions. *Journal of The Electrochemical Society*, 171:053502.
- 84. Hasan M., Shrimant B., Waters C. B., Gorski C. A., Arges C. (2024). Reducing ohmic resistances in membrane capacitive deionization using micropatterned ion-exchange membranes, ionomer infiltrated electrodes and ionomer coated nylon meshes. *Small*. (In press).

PARTS OF BOOKS

 Gorski, C., & Scherer, M. M. (2011). Fe²⁺ Sorption at the Fe Oxide-Water Interface: A Revised Conceptual Framework. In Tratnyek, P. G.; Grundl, T. J.; Haderlein, S. B. (Eds.), *Aquatic Redox Chemistry*. (1071), (pp. 315-343). Peer-reviewed/refereed., ISBN/ISSN: 978-0-8412-2652-4

PATENTS

1. Hall, D., Lvov, S., Logan, B.E., Gorski, C.A. (2023). All aqueous thermally-regenerative battery. US Patent App. 18/041,032.

SELECT INVITED PRESENTATIONS

- *Electrochemical analyses of redox-active minerals: Insights and persisting challenges.* Electrochemical Society (ECS) National Meeting. October 9 13, 2022. Atlanta, GA.
- *Nagging Free Energy Relationships.* University of Delaware, Environmental Engineering Seminar. December 2, 2022.
- Using Electrodes for Desalination. Environmental Sciences: Water Gordon Research Conference 2022.
 June 19 June 24, 2022. Holderness, NH.
- *Experimentally comparing MCDI architectures in terms of energy demand and longevity.* International Capacitive Deionization and Electrosorption Meeting. 10/21. (Virtual).
- *Rationally selecting electrode materials for harvesting salinity gradient energy.* American Chemical Society National Meeting. Orlando, FL. 4/2/19.
- *Rationally selecting intercalating electrode materials for the water-energy nexus.* Materials Research Society National Meeting. Phoenix, AZ. 4/20/19.
- What I think about when I think about Fe(II)-catalyzed recrystallization. Biogeochemistry and Redox Transformations of Iron Workshop. Lech, Austria. 8/1/18.
- *Battery-Inspired Systems for Capturing Salinity Gradient Energy.* Keynote. Environmental Sciences: Water Gordon Research Seminar, Holderness, NH. June 2018.
- *Electrochemical Characterization of Manganese Oxide Electrodes for Water Desalination and Renewable Energy Production.* American Chemical Society National Meeting. 3/22/18.
- Assessing the role of oxide-associated Fe²⁺ in contaminant reduction reactions. Johns Hopkins University. Department of Geography and Environmental Engineering Seminar Series. 11/30/16.
- *Quantifying Mineral Redox Properties.* University of Delaware, Newark, Delaware. Civil and Environmental Engineering Seminar Series. 11/13/15.
- *Radionuclide-Mineral Redox Interactions: Current Progress and Future Outlook.* Keynote. Goldschmidt Conference. Prague, Czech Republic. 8/16/15-8/22/15.
- *Measuring and controlling reduction potentials in Fe oxide suspensions.* Telluride Science Research Center: Biogeochemistry and Redox Transformations of Iron Workshop. Telluride, CO. 8/4/14-8/8/14.
- *Mediated electrochemical analyses to characterize redox-active geochemical phases:* Application to iron-bearing clay minerals. Goldschmidt Conference. Florence, Italy. 8/25/13.
- Dynamics of electron transfer to and from Fe-bearing minerals: Electrochemical characterization of redox properties. Telluride Science Research Center: Biogeochemistry and Redox Transformations of Iron Workshop. Telluride, CO. 8/6/12-8/10/12.

- Interfacial redox chemistry in aquatic environments: From minerals to mediators. Providence, RI. Brown University. 3/5/12.
- *Influence of magnetite stoichiometry on Fe(II) uptake and nitrobenzene reduction.* Zurich, Switzerland. Environmental Chemistry Dept., ETH, Swiss Federal Institute of Technology. 6/12/09.
- Influence of magnetite stoichiometry on Fe(II) uptake and nitrobenzene reduction. Tübingen, Germany.
 Institute of Geosciences, Tübingen University. 6/10/09.

EXTERNALLY FUNDED RESEARCH PROJECTS

GORSKI AS PI

- *Thermodynamics and Redox Reactivity of Birnessite*. (PI: Gorski, C.A.; Co-PI: Heaney, P.) National Science Foundation: Environmental Chemistry. August 2023 July 2025. \$425,346.
- Integrated electrode-membrane assemblies for energy efficient MCDI across the salinity spectrum. (PI: Gorski, C.A.) Office of Naval Research. July 2022 June 2025. \$570,000.
- CAREER: Battery-inspired electrodes for efficiently desalinating water or harvesting salinity gradient energy. (PI: Gorski, C.A.) National Science Foundation: Environmental Engineering. August 2018 – July 2023. \$500,000.
- Linking Thermodynamics to Pollutant Reduction Rates by Fe(II) Bound to Iron Oxides. (PI: Gorski, C.A.) National Science Foundation: Environmental Chemistry. August 2018 – January 2021. \$361,265.
- SusChem: Manganese oxide supercapacitor charging/discharging mechanisms to capture energy using capacitive mixing (CapMix). (PI: Gorski, C.A.; Co-PI: Logan, B.E.) National Science Foundation: CBET Environmental Engineering. August 2016 July 2019. \$330,000.
- Collaborative Research: Recrystallization of Stable Iron Oxides in Reducing Environments. (PI: Gorski, C.A.; Co-PI: Fantle, M.S.). National Science Foundation: EAR Geobiology and Low-temp Geochemistry. August 2015 – July 2017. \$199,941.
- *Redox reactivity of iron-bearing clay minerals.* (PI: Gorski, C.A.) National Science Foundation: International Research Fellowship Program (IRFP). 2010. Amount awarded: \$139,500. (Awarded but declined due to an alternative funding source).

GORSKI AS A CO-PI

- Development of an All-Aqueous Thermally Regenerative Redox Flow Battery to Support Fossil Fuel Assets. (PI: Hall, D.E.; Co-PIs: Gorski, C.A., Lvov, S., Rau, M., Logan, B.E.) Department of Energy. March 2021 February 2023. \$250,000.
- Enabling Hydrogen Gas Production from Seawater Using Electrolytes Contained by Reverse Osmosis Membranes. (PI: Logan, B.E.; Co-PI: Gorski, C.A. and Hickner, M.A.) National Science Foundation: Environmental Engineering. September 2020 – August 2023. \$300,000.

- Materials and configurations for improved desalination performance using battery electrode deionization (BDI).
 (PI: Logan, B.E.; Co-PI: Gorski, C.A.). U.S.-Egypt Joint Science and Technology Fund. July 2019 June 2022. \$200,000.
- Development of an All-Aqueous Thermally Regenerative Redox Flow Battery to Support Fossil Fuel Assets. (PI: Hall, D.; Co-PI: Gorski, C.A., Logan, B.E., Lvov, S., Rau, M.). Department of Energy: Advanced Energy Storage Initiative Program. June 2021 May 2023. \$312,500.
- INGaR: Enhanced Gas Recovery using Chemical-Mechanical Fracturing. (PI: Velegol, D.; Co-PI: Gorski, C.A.) Halliburton Energy Services. September 2015 – August 2016. \$169,296.
- EAGER: SusChem: Enhanced electricity production from engineered salinity gradients using capacitive mixing.
 (PI: Logan, B.E.; Co-PI: Gorski, C.A.) National Science Foundation: CBET Environmental Engineering.
 April 2015 December 2015. \$130,000.
- Evaluate the Role of Fe-rich Mineral Phases in Controlling Tracer/Contaminant Behavior. (PI: Burgos, W.D.; Co-PI: Gorski, C.A.). Department of Energy: National Energy Technology Laboratory. November 2013 – November 2014. \$69,200.
- Geochemical transformations caused by CO2 injection or leakage. (PI: Burgos, W.D.; Co-PI: Gorski, C.A.).
 Department of Energy: National Energy Technology Laboratory. November 2012 March 2014. \$111,450.

INTERNALLY FUNDED RESEARCH PROJECTS

GORSKI AS PI

- *Electrochemical Oxygen Production by Deep-Sea Nodules*. (PI: Gorski, C.A.; Co-PI: Heaney, P.) Institutes of Energy and the Environment (IEE) Rapid Award. September 2024 – August 2025. \$15,000.
- Optimizing Sorbent Properties for Aqueous Electrochemical CO₂ Capture. (PI: Gorski, C.A.; Co-PI: Boualavong, J.) Institutes of Energy and the Environment (IEE) and the Institute for Computational and Data Sciences' (ICDS) Research Innovations with Scientists and Engineers (RISE) seed grant program. January 2023 May 2023. \$15,000.
- Unifying electrochemistry researchers at Penn State to identify strategic strengths and opportunities. (PI: Gorski, C.A.) Energy 2100 Faculty Fellow Program. May 2019 May 2020. \$12,000.
- Utilizing hydrotropes to increase flow battery storage densities. (PI: Gorski, C.A.; Co-PI: Hickey, R.; Co-PI: Logan, B.E.) Penn State Institute for Energy and the Environment (IEE) Seed Grant Smart Energy Systems. May 2018 December 2018. \$25,000.
- Optimizing the conversion of salinity gradient energy into electrical power through computational simulations. (PI: Gorski, C.A.; Co-PI: Dabo, I.) Penn State Institute for Energy and the Environment (IEE) Seed Grant – Future Energy Supplies. May 2017 – December 2017. \$25,000.
- *pH-gradient flow batteries for generating electricity from waste CO2 streams*. (PI: Gorski, C.A.; Co-PI: Logan, B.E.) MRI-PSIEE Seed Grant Convergence between Materials and Energy. May 2016 June 2016. \$10,000.

Chromium fate in groundwater systems: In situ investigation of chromium oxidation by manganese dioxide using electrochemical and synchrotron diffraction analyses. Penn State Institute for Energy and the Environment (IEE) Seed Grant Seed Grant. (PI: Gorski, C.A.; Co-PI: Heaney, P.). March 2015 – December 2015. \$25,000.

GORSKI AS A CO-PI

- Constraining Constraining Olivine Carbonation Rates in Igneous Mafic Formations. (PI: Fantle, M.S.; Co-PI: Gorski, C.A.) Penn State Institute for Energy and the Environment (IEE) Seed Grant –Climate & Ecosystem Change: Climate Solutions. May 2023 December 2023. \$30,000.
- New Low-Cost Flow Battery Chemistries via Ligand-Enhanced Redox Reactions. (PI: Hall, D.; Co-PI: Gorski, C.A.; Co-PI: Lvov, S.) Materials for Enhancing Energy and Environmental Stewardship Seed Grant Program. May 2019 May 2020. \$40,000.
- High Pressure/High Temperature Reactor Systems for Unconventional Oil and Gas Research. (PI: Burgos, W.D.; Co-PIs: Gorski, C.A., Alger, M., Velegol, D.) Research Equipment Grant, College of Engineering Penn State University. March 2015 February 2016. \$114,230.

ADVISING

COMPLETED PHD STUDENTS

- Jonathan Boualavong, Environmental Engineering. *Energy-Rate Tradeoffs in Electrochemical Carbon Capture*. January 2019 May 2023.
- Yingchi Cheng, Environmental Engineering. *Electrochemical Characterization of Redox Cycling for Energy Storage and Desalination*. August 2018 – December 2022.
- Jenelle Fortunato, Environmental Engineering. *Selection and characterization of manganese oxide electrodes for harnessing salinity gradient*. July 2016 December 2020.
- Prachi Joshi, Environmental Engineering and Biogechemistry. *The role of crystal defects in Fe*²⁺-*catalyzed recrystallization of iron oxides*. May 2015 May 2018.
- Mohammad Rahimi, Chemical Engineering, Co-advised by Bruce Logan. *Thermally Regenerative Ammonia Batteries for Converting Low-Grade Waste Heat to Electricity*. January 2015 – December 2017.

COMPLETED POST-DOCTORAL SCHOLARS

- Le Shi. Co-advised with Bruce Logan. *Electrochemical Water Desalination*. January 2020 December 2022.
- Moon Son. Co-advised with Bruce Logan. *Electrochemical Water Desalination*. Stage of Completion: Completed. 2017 - 2019.
- Gongde Chen. *Thermodynamics to Pollutant Reduction Rates by Fe(II) Bound to Iron Oxides*. February 2019 October 2021.
- Taeyoung Kim. Co-advised with Bruce Logan. *Battery electrodes to harvest salinity gradient energy and desalinate water*. January 2015 August 2018.

- Xiuping Zhu. Co-advised with Bruce Logan. *Converting waste heat to electricity*. January 2015 April 2016.
- Fubo Luan. Co-advised with William Burgos. *Reactivity of Fe(II)-bearing clay minerals with environmental contaminants.* January 2015 December 2017.

COMPLETED MASTERS STUDENTS

- Vineeth Pothanamkandathil. Environmental Engineering. *Comparing intercalation electrodes for energy efficient brackish water desalination*. August 2018 December 2019.
- Sydney Stewart. Environmental Engineering. *Explaining Reaction Rates Between Iron Oxide-Associated Ferrous Iron and Nitrobenzene*. August 2015 May 2017.
- S. Sarah Cronk. Environmental Engineering. *Soil Organic Carbon Protection in the Presence of Iron Oxides*. August 2013 December 2016.
- Prachi Joshi. Environmental Engineering. *Morphological Changes in Goethite during Atom Exchange with Aqueous Fe*²⁺. August 2013 May 2015.
- Rebecca Edwards. Environmental Engineering. Measuring Reduction Potentials of Fe Oxide Aqueous Fe²⁺ Redox Couples Using Mediated Electrochemical Techniques. January 2013 – August 2015.

COMPLETED UNDERGRADUATE HONOR STUDENTS

• Aron Griffin. Engineering Science and Mechanics. *Secondary Mineralization of Ferrihydrite under Reducing Redox Conditions: An Electrochemical Study*. May 2015.

IN-PROGRESS PHD STUDENTS

- Vineeth Pothanamkandathil, Environmental Engineering. *Charge storage mechanisms in intercalation materials*. January 2020 present.
- Timothy Hudak, Chemical Engineering. *Redox Mediated Electrochemical Desalination*. August 2022 present.
- Mahmudul Hasan, Chemical Engineering. *Micro-patterned ion exchange membranes for electrochemical desalination*. August 2020 present.
- Anthony Pompa, Chemistry. Co-advised with Matthew Fantle. *Constraining olivine carbonation rates for CO*² *sequestration in igneous rock formations*. January 2023 present.

IN-PROGRESS POST-DOCTORAL SCHOLARS

Paolo Benevides. Co-advised with Peter Heaney. *Redox properties and reactivities of manganese oxides*.
 January 2024 – present.

AWARDS

- Penn State Engineering Alumni Society (PSEAS) Outstanding Advising Award. (2023).
- Environmental Science & Technology and Environmental Science & Technology Letters Virtual Issue: Early Career Scientists. (2019).

- NSF CAREER Award, National Science Foundation. (2018).
- Excellence in Review Award, Environmental Science & Technology Letters. (2018).
- Excellence in Review Award, Environmental Science & Technology. (2016).
- Emmert H. Bashore Faculty Development Professorship, Pennsylvania State University. (2012 2014).
- Telluride Science Research Center's Peter Salamon Award for Young Scientists, Telluride Science Research Center. (2012).
- o C. Ellen Gonter Environmental Chemistry Paper Award, American Chemical Society. (2009).

PROFESSIONAL MEMBERSHIPS

- o American Chemical Society (ACS) (Member, 2006-present)
- Association of Environmental Engineering and Science Professors (AEESP) (Member, 2012–present)

SYNERGISTIC ACTIVITIES

EDITORIAL BOARD

• Environmental Science & Technology: Editorial Advisory Board Member. October 2020 - Present.

JOURNAL ARTICLE REVIEWS

- General Science: Science, Nature, Proceedings of the National Academy of Sciences (PNAS), Chemical Society Reviews, Chemical Reviews, Chemical Society Reviews.
- Environmental Science and Geochemistry: Environmental Science & Technology, Environmental Science & Technology Letters, Environmental Chemistry, Environmental Science: Nano, The Journal of Physical Chemistry, Geochimica et Cosmochimica Acta, Chemical Geology, Clays and Clay Minerals, Metals, Environmental Chemistry, Langmuir, Journal of Nanoparticulate Research, European Mineralogy Union book series, Environmental Science: Nano.
- Environmental Engineering: Joule, Nature Chemical Engineering, Energy & Environmental Science, Industrial & Engineering Chemical Research
- Electrochemistry: Journal of the Electrochemical Society, Electrochemistry Communications.

PROPOSAL REVIEWER AND PANELIST

 U.S. National Science Foundation, Department of Energy, Swiss National Science Foundation, Penn State Institutes of Energy and the Environment (PSIEE) Seed Grant Program, Penn State College of Engineering REU program.

SYMPOSIUM ORGANIZER

Aquatic Redox Chemistry. 2-day session. American Chemical Society National Meeting. March 2024. New Orleans, LA.

- *Aquatic Redox Chemistry*. 2-day session. American Chemical Society National Meeting. March 2023. Indianapolis, IA.
- *Electrochemistry in the Environment*. 1-day session. Electrochemical Society National Meeting. October 2022. Atlanta, GA.
- Processes: Osmotically-Driven Membrane Processes for Water and Energy. Half-day session. North American Membrane Society (NAMS) Meeting. May 2019. Pittsburgh, PA.
- *Creating and Exploiting Salinity Gradients*. Half-day session. American Chemical Society National Meeting. August 2016. Philadelphia, PA.
- *Redox and Radical Biogeochemistry*. Half-day session. Goldschmidt Conference. August 2015. Prague, Czech Republic.
- *Global Biogeochemical Cycles in the Anthropocene*. Half-day session. Association of Environmental Engineering and Science Professors (AEESP) Bi-Annual Conference. August 2013.
- Iron Redox Transformations and Their Impact on Trace Elements in Natural and Engineered Systems. 1-day session. Goldschmidt Conference. August 2013. Florence, Italy.

SERVICE AT PENN STATE UNIVERSITY

UNIVERSITY LEVEL

- Chair of Penn State Institute for Energy and the Environment (IEE) Award Committee. 2023 present.
- Reviewer for Penn State Institute for Energy and the Environment (IEE) Seed Grant Program. 2016, 2017, 2021, 2022, 2024.
- Energy 2100 Fellow Electrochemistry. (May 2019 May 2020). *Tasked with organizing researchers across the university working on electrochemistry to strategically pursue funding opportunities and improve education*.
- Search Committee Member for Faculty Hire as part of the Consortium for Integrated Energy Systems (CIES). (October 2020 – April 2021).
- Member of Dept. of Geosciences Faculty Search Committee. (August 2015 June 2016).

COLLEGE LEVEL

- CoE NSF Career Panel panel member discussing strategies, Contributor. (April 2019).
- CoE Summer REU proposal reviewer (10 proposals). (April 2015).
- CoE Summer REU proposal reviewer (6 proposals). (April 2014).
- Engineering Voting Unit Nominating Committee for the Faculty Senate and Graduate Council Elections, Member. (November 2014 - April 2015).
- Engineering Librarian Search Committee, Participant. (2013).

DEPARTMENT LEVEL

- o Promotion and Tenure Committee, Member. (August 2022 Present).
- CEE Undergraduate Committee, Chair. (August 2020 August 2023).
- o CEE Undergraduate Coordinator. (January 2023 August 2023).
- o Dept. Head Advisory Committee, Member. (August 2021 May 2022, August 2013 August 2014).
- Area Coordinator (Environmental). (May 2020 May 2021; May 2024 present)
- o Covid 19: Research Ramp Up Committee, Member. (May 2020 August 2020).
- CEE Undergraduate Committee, Committee Member. (September 2017 May 2020).
- Director of Environmental Engineering Minor. (August 2015 August 2018).
- o Search Committee for Water Resources Hire, Member. (September 2016 March 2017).
- Dept. Events Committee, Director. (August 2014 August 2015).
- CEE Safety Committee, Member. (August 1, 2012 August 31, 2013).