

# BYRON H. FARNUM

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## Experience/Education

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Assistant Professor Auburn University Department of Chemistry and Biochemistry	2016-present
Postdoctoral Research Associate University of North Carolina at Chapel Hill Department of Chemistry Advisor: <i>Thomas J. Meyer</i>	2012-2016
Ph.D./M.A. in Chemistry Johns Hopkins University Department of Chemistry Advisor: <i>Gerald J. Meyer</i>	2008-2012
B.S. in Chemistry University of South Carolina Department of Chemistry and Biochemistry Advisor: <i>John L. Ferry</i>	2004-2008

## Honors/Awards

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• NSF CAREER Award	2020
• UNC Postdoctoral Award for Research Excellence	2015
• Perkin Medal Scholarship	2011
• JHU Chemistry Alumni Graduate Fellowship	2011
• ACS Undergraduate Student Award in Environmental Chemistry	2008
• Magellan Undergraduate Research Scholarship	2007
• Rothberg Scholarship	2004
• Palmetto Fellows Scholarship	2004

## Publications (\*denotes corresponding author, †denotes equal contribution)

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- 34) Saha, S.; Sahil, S.T.; Mazumder, M.M.R.; Stephens, A.M.; Cronin, B.; Duijn, E.C.; Jurss, J.W.; **Farnum, B.H.\*** "Synthesis, Characterization, and Electrocatalytic Activity of Bis(pyridylimino)isoindoline Cu(II) and Ni(II) Complexes" *Dalton Trans.* **2021** *Advance Article* DOI: [10.1039/D0DT03030A](https://doi.org/10.1039/D0DT03030A)
- 33) Wang, D.; **Farnum, B.H.**; Dares, C.J.; Meyer, T.J.\* "Chemical Approaches to Artificial Photosynthesis: A Molecular, Dye-Sensitized Photoanode for O<sub>2</sub> Production Prepared by Layer-by-Layer Self-Assembly" *J. Chem. Phys.* **2020**, *152*, 244706. DOI: [10.1063/5.0007383](https://doi.org/10.1063/5.0007383)
- 32) Bredar, A.R.C.†; Chown, A.L.†, Burton, A.R.†; **Farnum, B.H.\*** "Electrochemical Impedance Spectroscopy of Metal Oxide Electrodes for Energy Applications" *ACS Appl. Energy Mater.* **2020**, *3*, 66-98. DOI: [10.1021/acsaem.9b01965](https://doi.org/10.1021/acsaem.9b01965)
- 31) Zhen, M.; Huang, Z.; Ji, H.; Qiu, F.; Zhao, D.\*; Bredar, A.R.C.; **Farnum, B.H.** "Simultaneous Control of Soil Erosion and Arsenic Leaching at Disturbed Land using Polyacrylamide Modified Magnetite Nanoparticles" *Sci. Total Environ.* **2020**, *702*, 134997. DOI: [10.1016/j.scitotenv.2019.134997](https://doi.org/10.1016/j.scitotenv.2019.134997)

- 30) Kokal, R.K.; Bredar, A.R.C.; **Farnum, B.H.**; Deepa, M.\* "Solid-State Succinonitrile/Sulfide Hole Transport Layer and Carbon Fabric Counter Electrode for a Quantum Dot Solar Cell" *ACS Appl. Nano Mater.* **2019**, *2*, 7880-7887. DOI: [10.1021/acsnm.9b01873](https://doi.org/10.1021/acsnm.9b01873)
- 29) Richburg, C.S.; **Farnum, B.H.**\* "Influence of Pyridine on the Multielectron Redox Cycle of Nickel Diethyldithiocarbamate" *Inorg. Chem.* **2019**, *58*, 15371-15384. DOI: [10.1021/acs.inorgchem.9b02430](https://doi.org/10.1021/acs.inorgchem.9b02430)
- 28) Bredar, A.R.C.; Blanchet, M.D.; Comes, R.B.; **Farnum, B.H.**\* "Evidence and Influence of Copper Vacancies in p-Type CuGaO<sub>2</sub> Mesoporous Films" *ACS Appl. Energy Mater.* **2019**, *2*, 19-28. DOI: [10.1021/acsaem.8b01558](https://doi.org/10.1021/acsaem.8b01558)
- 27) Wang, D.; Sampaio, R.N.; Troian-Gautier, L.; Marquard, S.L.; **Farnum, B.H.**; Sherman, B.D.; Sheridan, M.V.; Dares, C.J.; Meyer, G.J.; Meyer, T.J.\* "Molecular Photoelectrode for Water Oxidation Inspired by Photosystem II" *J. Am. Chem. Soc.* **2019**, *141*, 7926-7933. DOI: [10.1021/jacs.9b02548](https://doi.org/10.1021/jacs.9b02548)
- 26) Niklas, J.E.; **Farnum, B.H.**; Gorden, J.D.; Gorden, A.E.V.\* "Structural Characterization and Redox Activity of a Uranyl Dimer and Transition-Metal Complexes of a Tetradentate BIAN Ligand" *Organometallics* **2017**, *36*, 4626-4634. DOI: [10.1021/acs.organomet.7b00454](https://doi.org/10.1021/acs.organomet.7b00454)

**Prior to Auburn University**

- 25) Wang, D.; Wang, Y.; Brady, M.D.; Sheridan, M.V.; Sherman, B.D.; **Farnum, B.H.**; Liu, Y.; Marquard, S.L.; Meyer, G.J.; Dares, C.J.; Meyer, T.J.\* "A Donor-Chromophore-Catalyst Assembly for Solar CO<sub>2</sub> Reduction" *Chem. Sci.* **2019**, *10*, 4436-4444. DOI: [10.1039/C8SC03316A](https://doi.org/10.1039/C8SC03316A)
- 24) Wang, D.; Marquard, S.L.; Troian-Gautier, L.; Sheridan, M.V.; Sherman, B.D.; Wang, Y.; Eberhart, M.S.; **Farnum, B.H.**; Dares, C.J.\*; Meyer, T.J.\* "Interfacial Deposition of Ru(II) Bipyridine-Dicarboxylate Complexes by Ligand Substitution for Applications in Water Oxidation Catalysis" *J. Am. Chem. Soc.* **2018**, *140*, 719-726. DOI: [10.1021/jacs.7b10809](https://doi.org/10.1021/jacs.7b10809)
- 23) Wang, D.; Sherman, B.D.; **Farnum, B.H.**; Sheridan, M.V.; Marquard, S.L.; Eberhart, M.S.; Dares, C.J.\*; Meyer, T.J.\* "Plasmon-Enhanced Light-Driven Water Oxidation by a Dye-Sensitized Photoanode" *Proc. Natl. Acad. Sci. U.S.A.* **2017**, *114*, 9809-9813. DOI: [10.1073/pnas.1708336114](https://doi.org/10.1073/pnas.1708336114)
- 22) Wang, D.; Sheridan, M.V.; Shan, B.; **Farnum, B.H.**; Marquard, S.L.; Eberhart, M.S.; Nayak, A.; Dares, C.; Das, A.; Bullock, R.M.; Meyer, T.J.\* "Layer-by-Layer Molecular Assemblies for Dye-Sensitized Photoelectrosynthesis Cells Prepared by Atomic Layer Deposition" *J. Am. Chem. Soc.* **2017**, *139*, 14518-14525. DOI: [10.1021/jacs.7b07216](https://doi.org/10.1021/jacs.7b07216)
- 21) Wang, D.; **Farnum, B.H.**; Sheridan, M.; Marquard, S.; Sherman, B.; Meyer, T.J.\* "Inner Layer Control of Performance in a Dye Sensitized Photoelectrosynthesis Cell" *ACS Appl. Mater. Interfaces* **2017**, *9*, 33533-33538. DOI: [10.1021/acsmi.7b00225](https://doi.org/10.1021/acsmi.7b00225)
- 20) Shan, B.; **Farnum, B.H.**; Wee, K-R.; Meyer, T.J.\* "Generation of Long-Lived Redox Equivalents in Self-Assembled Bilayer Structures on Metal Oxide Electrodes" *J. Phys. Chem. C* **2017**, *121*, 5882-5890. DOI: [10.1021/acs.jpcc.6b12416](https://doi.org/10.1021/acs.jpcc.6b12416)
- 19) Coppo, R.L.; **Farnum, B.H.**; Sherman, B.D.; Neyde, Y.M.\*; Meyer, T.J.\* "The Role of Layer-by-Layer, Compact TiO<sub>2</sub> Films in Dye-Sensitized Photoelectrosynthesis Cells" *Sustainable Energy Fuels* **2017**, *1*, 112-118. DOI: [10.1039/C6SE00022C](https://doi.org/10.1039/C6SE00022C)
- 18) Shan, B.; Das, A.K.; Marquard, S.; **Farnum, B.H.**; Wang, D.; Bullock, R.M.; Meyer, T.J.\* "Photogeneration of Hydrogen from Water by a Robust Dye-Sensitized Photocathode" *Energy Environ. Sci.* **2016**, *9*, 3693-3697. DOI: [10.1039/C6EE02903E](https://doi.org/10.1039/C6EE02903E)
- 17) **Farnum, B.H.**; Wee, K-R.; Meyer, T.J.\* "Self-Assembled Molecular p/n Junction for Applications in Dye-Sensitized Photoelectrochemical Cells" *Nature Chem.* **2016**, *8*, 845-852. DOI: [10.1038/nchem.2536](https://doi.org/10.1038/nchem.2536)
- 16) Flynn, C.J.; McCullough, S.M.; Oh, E.E.; Li, L.; Mercado, C.C.; **Farnum, B.H.**; Li, W.; Donley, C.L.; You, W.; Nozik, A.J.; McBride, J.R.; Meyer, T.J.; Kanai, Y.; Cahoon, J.F.\* "Site-Selective Passivation of Defects in NiO Solar Photocathodes by Targeted Atomic Deposition" *ACS Appl. Mater. Interfaces* **2016**, *8*, 4754-4761. DOI: [10.1021/acsmi.6b01090](https://doi.org/10.1021/acsmi.6b01090)

- 15) **Farnum, B. H.**; Nakada, A.; Ishitani, O.; Meyer, T.J.\* "Bias-Dependent Oxidative and Reductive Quenching of a Molecular Excited-State Assembly Bound to a Transparent Conductive Oxide" *J. Phys. Chem. C* **2015**, *119*, 25180-25187. DOI: [10.1021/acs.jpcc.5b05801](https://doi.org/10.1021/acs.jpcc.5b05801)
- 14) **Farnum, B.H.**; Morseth, Z.A.; Brennaman, M.K.; Papanikolas, J.M.; Meyer, T.J.\* "Application of Degenerately Doped Metal Oxides in the Study of Photoinduced Interfacial Electron Transfer" *J. Phys. Chem. B* **2015**, *119*, 7698-7711. DOI: [10.1021/jp512624u](https://doi.org/10.1021/jp512624u)
- 13) Garvey, T.; **Farnum, B.H.**; Lopez, R.\* "Pulsed Laser Deposited Porous Nano-Carpets of Indium Tin Oxide Films and Their Use as Charge Collectors in Core-Shell Structures for Dye Sensitized Solar Cells" *Nanoscale* **2015**, *7*, 2400-2408. DOI: [10.1039/C4NR05793G](https://doi.org/10.1039/C4NR05793G)
- 12) **Farnum, B.H.**; Morseth, Z.A.; Brennaman, M.K.; Papanikolas, J.M.; Meyer, T.J.\* "Driving Force Dependent Photo-induced Electron Transfer at Degenerately Doped, Optically Transparent Semiconductor Nanoparticle Interfaces" *J. Am. Chem. Soc.* **2014**, *136*, 15869-15872. DOI: [10.1021/ja508862h](https://doi.org/10.1021/ja508862h)
- 11) Wee, K-R.; Brennaman, M.K.; Alibabaei, L.; **Farnum, B.H.**; Sherman, B.; Lapidés, A.M.; Meyer, T.J.\* "Stabilization of Ruthenium(II) Polypyridyl Chromophores on Nanoparticle Metal Oxide Electrodes in Water by Hydrophobic PMMA Overlayers" *J. Am. Chem. Soc.* **2014**, *136*, 13514-13517. DOI: [10.1021/ja506987a](https://doi.org/10.1021/ja506987a)
- 10) Song, W.; Vannucci, A.K.; **Farnum, B.H.**; Lapidés, A.M.; Brennaman, M.K.; Kalanyan, B.; Alibabaei, L.; Concepcion, J.J.; Losego, M.D.; Parsons, G.N.; Meyer, T.J.\* "Visible Light Driven Benzyl Alcohol Dehydrogenation in a Dye-Sensitized Photoelectrosynthesis Cell" *J. Am. Chem. Soc.* **2014**, *136*, 9773-9779. DOI: [10.1021/ja505022f](https://doi.org/10.1021/ja505022f)
- 9) Alibabaei, L.; **Farnum, B.H.**; Kalanyan, B.; Brennaman, M.K.; Losego, M.; Parsons, G.N.; Meyer, T.J.\* "Atomic Layer Deposition of TiO<sub>2</sub> on Mesoporous nanoITO: Conductive Core-Shell Photoanodes for Dye-Sensitized Solar Cells" *Nano Lett.* **2014**, *14*, 3255-3261. DOI: [10.1021/nl5006433](https://doi.org/10.1021/nl5006433)
- 8) **Farnum, B.H.**; Morseth, Z.A.; Lapidés, A.M.; Rieth, A.J.; Hoertz, P.G.; Brennaman, M.K.; Papanikolas, J.M.; Meyer, T.J.\* "Photoinduced Interfacial Electron Transfer within a Mesoporous Transparent Conducting Oxide Film" *J. Am. Chem. Soc.* **2014**, *136*, 2208-2211. DOI: [10.1021/ja4106418](https://doi.org/10.1021/ja4106418)
- 7) Ward, W.M.; **Farnum, B.H.**; Siegler, M.; Meyer G.J.\* "Chloride Ion-Pairing with Ru(II) Polypyridyl Compounds in Dichloromethane" *J. Phys. Chem. A* **2013**, *117*, 8883-8894. DOI: [10.1021/jp404838z](https://doi.org/10.1021/jp404838z)
- 6) **Farnum, B.H.**; Ward, W.M.; Meyer, G.J.\* "Flash-Quench Studies on the One-Electron Reduction of Triiodide" *Inorg. Chem.* **2013**, *52*, 840-847. DOI: [10.1021/ic302002u](https://doi.org/10.1021/ic302002u)
- 5) **Farnum, B.H.**; Jou, J.J.; Meyer, G.J.\* "Visible Light Generation of I-I Bonds by Ru<sup>II</sup>-tris(diimine) Excited-States" *Proc. Natl. Acad. Sci.* **2012**, *109*, 15628-15633. DOI: [10.1073/pnas.1118340109](https://doi.org/10.1073/pnas.1118340109)
- 4) **Farnum, B.H.**; Gardner, J.M.; Marton, A.; Narducci-Sarjeant, A.A.; Meyer, G.J.\* "Influence of Ion Pairing on the Oxidation of Iodide by MLCT Excited States" *Dalton Trans.* **2011**, *40*, 3830-3838. DOI: [10.1039/C0DT01447H](https://doi.org/10.1039/C0DT01447H)
- 3) Rowley, J.G.; **Farnum, B.H.**; Ardo, S.; Meyer, G.J.\* "Iodide Chemistry in Dye-Sensitized Solar Cells: Making and Breaking I-I Bonds for Solar Energy Conversion" *J. Phys. Chem. Lett.* **2010**, *1*, 3132-3140. DOI: [10.1021/jz101311d](https://doi.org/10.1021/jz101311d)
- 2) **Farnum, B.H.**; Gardner, J.M.; Meyer, G.J.\* "Flash-Quench Technique Employed to Study the One-Electron Reduction of Triiodide in Acetonitrile: Evidence for a Diiodide Reaction Product" *Inorg. Chem.* **2010**, *49*, 10223-10225. DOI: [10.1021/ic1015466](https://doi.org/10.1021/ic1015466)
- 1) Gardner, J.M.; Abrahamsson, M.; **Farnum, B.H.**; Meyer, G.J.\* "Visible Light Generation of Iodine Atoms and I-I Bonds: Sensitized I<sup>-</sup> Oxidation and I<sub>3</sub><sup>-</sup> Photodissociation" *J. Am. Chem. Soc.* **2009**, *131*, 16206-16214. DOI: [10.1021/ja905021c](https://doi.org/10.1021/ja905021c)

## Presentations

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### ***Invited Seminars***

- 10) New Jersey Institute of Technology – VIRTUAL 9/2020  
“Mechanistic Understanding of 1e<sup>-</sup> vs 2e<sup>-</sup> Redox Reactions with Nickel Coordination Compounds”
- 9) Photochemistry Spotlight Virtual Symposium – VIRTUAL 6/2020  
“Harnessing Multi-Electron Nickel Redox Chemistry for Electrochemical Energy Storage”
- 8) Southwest Regional ACS Meeting – El Paso, TX 11/2019  
“Copper Delafossites: Diverse Materials for Solar Energy Conversion and Storage”
- 7) National ECS Meeting – Atlanta, GA 10/2019  
“Copper Delafossites: Diverse Materials for Solar Energy Conversion and Storage”
- 6) University of Alabama – Tuscaloosa, AL 2/2019  
“Copper Delafossites: Diverse Materials for Solar Energy Conversion and Storage”
- 5) Southeast ACS Meeting – August, GA 11/2018  
“Copper Delafossites: Diverse Materials for Solar Energy Conversion and Storage”
- 4) University of West Florida – Pensacola, FL 10/2018  
“Copper Delafossites: From Energy Conversion to Energy Storage”
- 3) National ACS Meeting – New Orleans, LA 3/2018  
“New Synthetic Methods and Aqueous Electrochemical Characterization of p-Type CuGaO<sub>2</sub> Nanocrystals”
- 2) Florida ACS Meeting – Tampa, FL 5/2017  
“Nanocrystalline CuMO<sub>2</sub> p-Type Materials: Synthesis and Characterization”
- 1) GRS: Electron Donor-Acceptor Interactions – Newport, RI 8/2014  
“Core-Shell Photocathodes for Dye-Sensitized Solar Energy Conversion”

### ***Contributed Seminars***

- 4) National ACS Meeting – Philadelphia, PA (CANCELED) 3/2020  
“Mechanistic Insights into Two-Electron Transfer Reactions with First-Row Transition Metal Complexes”
- 3) National ACS Meeting – Philadelphia, PA (CANCELED) 3/2020  
“Copper Delafossites: Diverse Materials for Solar Energy Conversion and Storage”
- 2) National ACS Meeting – San Diego, CA 3/2016  
“Self-Assembled Molecular p/n Junctions for Applications in Dye-Sensitized Solar Energy Conversion”
- 1) Mid-Atlantic ACS Meeting (MARM) – Baltimore, MD 6/2012  
“Fundamental Insights into Regeneration and Recombination with Iodide/Triiodide in Dye-Sensitized Solar Cells”

### ***Contributed Posters***

- 10) GRC: Electrochemistry – Ventura, CA 1/2020  
“Mechanistic Understanding of 1e<sup>-</sup> vs 2e<sup>-</sup> Redox Reactions with Nickel Diethyldithiocarbamate”
- 9) GRC: Electron Donor-Acceptor Interactions – Newport, RI 8/2018  
“Toward Multi-Electron Redox Cycles with Nickel Coordination Compounds”
- 8) EFRC Annual Research Review – Chapel Hill, NC 5/2015  
“Photoanodic and Photocathodic Charge Separation at Mesoporous Sensitized nanoITO Electrodes”
- 7) GRC: Electron Donor-Acceptor Interactions – Newport, RI 8/2014  
“Photoinduced Electron Transfer at ITO Nanoparticle Interfaces: Fundamental Studies and Applications Toward Core-Shell Photoelectrodes”
- 6) EFRC Annual Research Review – Chapel Hill, NC 5/2014  
“Synthesis and Characterization of Core-Shell nanoITO-NiO p-Type Materials”

- 5) Department of Energy EFRC Principal Investigator Meeting – Washington, DC 7/2013  
“Nanostructured Metal Oxide Based Materials for Applications in Dye-Sensitized Photoelectrosynthesis Cells,”
- 4) Chemical Heritage Foundation Innovation Day – Philadelphia, PA 9/2011  
“Dye-Sensitized Solar Cells: A Molecular Based Approach to Solar Energy Conversion”
- 3) GRC: Photochemistry – Easton, MA 7/2011  
“Photochemical Flash-Quench Experiments for Triiodide Reduction: Kinetic Limitations for Breaking a Chemical Bond,”
- 2) GRC: Electron Donor-Acceptor Interactions – Newport, RI 8/2010  
“Photoinduced Iodide Oxidation and Triiodide Reduction: A Flash-Quenching Experiment,”
- 1) National ACS Meeting – New Orleans, LA 3/2008  
“Investigating the Photocatalytic Properties of a Family of Calcium Bismuth Oxides,”

## Leadership/Service

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- External Advisory Board
  - ACS Applied Energy Materials 2018-present
- Associate Chair
  - Gordon Research Seminar: Photochemistry 2011
- Auburn University New Faculty Scholar 2016-2017
- Journal Reviewer
  - *ACS Nano*, *ACS Appl. Mater. Interfaces*, *ACS Appl. Energy Mater.*, *ChemSusChem*, *Dalton Trans.*, *Inorg. Chim. Acta.*, *J. Chem. Phys.*, *Langmuir*, *Polyhedron*
- Active Memberships
  - American Chemical Society, Electrochemical Society

## Teaching

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### Auburn University

- CHEM 1030 – Fundamentals of Chemistry I (Fall 2019, Fall 2020)
- CHEM 4100 – Inorganic Chemistry (Fall 2018)
- CHEM 4110 – Inorganic Chemistry II (Spring 2019, Spring 2021)
- CHEM 7100 – Advanced Inorganic Chemistry (Fall 2016, Fall 2017, Spring 2020)
- CHEM 7160 – Advanced Topics in Inorganic Chemistry: Solid State (Spring 2018)