

First Debra Dolliver Memorial Lecture

Meet the Speaker: **Prof. Elizabeth T. Papish**

University of Alabama

“The Big Impact of One Small Remote Group for Energy Related Catalysis and Protic Anticancer Compounds”



Abstract: We aim to apply bioinorganic and organometallic chemistry to problems that relate to green chemistry and sustainability. We are exploring how protic and electron donor groups impact catalysis. We have pursued reactivity inspired by the need for energy storage, specifically carbon dioxide reduction. Recently, we designed new pincer ligands using N-heterocyclic carbene (NHC) and pyridinol rings that can change their properties by protonation and deprotonation, rather than lengthy synthesis. The most active transition metal catalysts with these pincers use methoxy groups which balance electron donor ability with stability. This has allowed for formation of ruthenium and nickel complexes that perform catalytic and light driven carbon dioxide reduction. We have also demonstrated that the OH derivatives can be switched on or off for catalysis with acid concentration. One of our ruthenium complexes is record setting in terms of reaction rates and selectivity. CO₂ reduction is of fundamental importance to the impending global energy crisis, and carbon dioxide reduction (when coupled with water oxidation) can allow for a sustainable method of energy storage in solar fuels. Furthermore, we have studied our hydroxyl substituted bipyridine ligands as a part of ruthenium based anticancer metallo-prodrugs. The ruthenium complexes are light activated and show selective toxicity towards cancer cells (vs. normal cells).

Bio: Elizabeth T. Papish was born and raised on Long Island, NY. She studied chemistry at Cornell Univ. (BA, 1997) and Columbia Univ. (PhD, 2002). She has taught at Franklin & Marshall College (2002-3), Salisbury Univ. (Asst. Prof. 2003-2007), Drexel Univ. (Asst. Prof. 2007-2012, Assoc. Prof. 2012-2013), and at the Univ. of Alabama (Assoc. Prof. 2013-2019, Full Prof. 2019-present). Her research group studies bioinorganic and organometallic chemistry with an emphasis on designing new organic ligands for the use of transition metal complexes in energy related catalysis applications and for metal-based therapies for health applications. She is the recipient of an NSF CAREER award (2009) and has been honored with the "Outstanding Research Mentor of the Year Award" at Salisbury Univ. in 2007 and with the "College of Arts and Sciences Teaching Award" for excellence in teaching and mentorship from Drexel Univ. in 2012. In 2013, Papish and her student received the "Division of Inorganic Chemistry Award for Undergraduate Research" from the American Chemical Society. Her research is currently supported by NSF and NIH.