

College of Liberal Arts and Sciences
Spring 2021 Chemistry Seminar Series
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Shining a light on biology

Abstract:

Cell metabolism and function is altered in many of the major diseases, like cancer and diabetes. As a group these diseases are the leading causes of death globally and are often of a highly heterogenous nature with no single cause. Due to this there will be no one 'super' drug nor one 'gold' standard method of detection, instead we need a plethora of methods that allow us to match the complexity of diseases associated with altered metabolism. However to develop viable therapies we need an "in depth" knowledge of this metabolic function at the cellular level as we need to not only understand the disease itself in individuals but also how the local environment (e.g. at the cell level) may influence prognosis and treatment efficacies. We need methods that allow for rapid diagnosis and evaluation of interventions in cells. The development of molecular probes that enable the visualisation of cell metabolism and function in live cells will not only provide new diagnostic and prognostic tools but also help to develop a new therapy. Luminescent metal ion complexes of transition and lanthanide ions have demonstrated promise as cellular imaging agents, due to their distinctive photo-physical properties.¹⁻⁴ For these complexes to be useful tools for biological research it is imperative that these complexes are selective and sensitive to biological processes. I will present our work on developing and commercialising luminescent metal complexes for live cell imaging applications and their use in disease diagnosis.

Bio:

Dr Sally Plush is an Associate Professor in Bioinorganic Chemistry at the University of South Australia and leads the Bioinorganic Synthesis and Imaging research group. Dr Plush completed her PhD in 2004 at the University of Adelaide with Professor Stephen Lincoln 'Interactions of Proximate Amino Acid Residues in Polyaza Macrocycles'. She was then awarded a 2 year Irish Research Council Science and Engineering Fellowship to develop luminescent lanthanide ion anion sensors with Professor Thorri Gunnlaugsson at Trinity College Dublin. This was followed by a postdoctoral fellowship at UT Southwestern Medical Centre at Dallas with Professor Dean Sherry developing magnetic resonance imaging contrast agents. In 2008 she commenced her current employment at the University of South Australia. She co-founded a company, ReZolve Scientific, in 2014 for the sale of live cell imaging agents that were developed as a consortium of chemists and biologists in Australia. Her research is mainly focused on advancing knowledge in biology and improving health, by synthesising fluorescent and luminescent molecules and developing improved filtration devices. Our group is especially focused on developing theranostic agents for cancer and metabolic diseases.