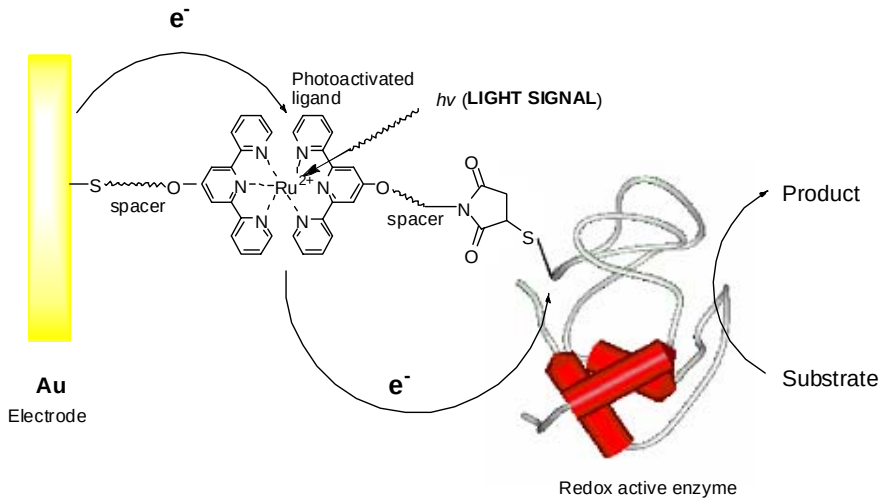
Light-activated Bioconjugates for Biosensing

Background and objective: Bioelectronics and biosensors are active areas of research at the interface of organic, inorganic, physical and biochemistry with great potential to revolutionize a number of fields in the medical sciences including medical device and diagnostics technology. The objective of this work is to synthesize *bioconjugates*, i.e., proteins/enzymes linked to photo-activated synthetic metal coordinated ligands. The combined properties of such bioconjugates could lead to bioelectronic circuits and sensors that are *responsive to light.*

Expected outcomes: A light-activated biosensor has a number of advantages over traditional biosensors including:

- *Increased sensitivity* as the sensor is "off" until triggered by light – this means the user can introduce the analyte(s) over time, allow them to diffuse through the device, etc., before the device is turned "on" and a reading is taken.
- *Increased lifetime,* again this is because the sensor (the enzymes included) are "off" until reading is triggered by light.
- *Output is easily scalable* as the sensor is driven by light (input) and its intensity can be easily controlled using filters and/or lasers, the maximum output can easily be scaled.
- *Micro- or nanoscale biofuel cells* could also be created using this approach were light is used to drive device such as drug delivery devices (under the skin).



Schematic drawing of the targeted light-activated bio-sensor based on our design (only half of the electro-chemical is shown in this cartoon).

Progress to date:

i) Synthesis of the first light-activated bioconjugates has been completed.
ii) Photophysical studies (determine rates / efficiency) are well advanced.

Things to do:

i) Linking our systems to surfaces (electrodes).
ii) Test out device under real conditions.

Contact details:

Dr. Pall Thordarson, ARC Australian Research Fellow, School of Chemistry, The University of Sydney, NSW 2006, Australia. Tel: +61-(0)2-9351-4456
e-mail: p.thordarson@chem.usyd.edu.au