**Development of the next generation of chiral surfactants**

Surfactants are critical to everyday life, they have wide ranging applications from detergents to agrochemicals and even firefighting with many of the applications revolving around the surfactants ability to embed or penetrate phospholipid bilayers. Commonly these surfactants are based on a charged ammonium headgroup with an alkyl tail which utilize electrostatic interactions to cross membranes. Recently it has been shown that chirality of molecular species can greatly contribute towards the ability for molecules to penetrate membranes however this has not been applied to surfactants as previously they have been too difficult to prepare in enantiomerically pure forms. Recent reports from the Kitching group have demonstrated a simple manner for the preparation of enantiopure ammoniums which could be employed to rapidly generate next- generation surfactants with much higher propensity for membrane traversal. This project will look to develop new chiral ammonium surfactants, delve into their ability to assemble into higher order macromolecular chiral structures and utilize controlled fluorine incorporation to tune the hydrophobicity properties.