**ABSTRACT**

The synthesis of a novel functionalised cage surfactant to transport metal ions across synthetic and biological membranes  

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This thesis presents the successful synthesis of a novel functionalised cage surfactant which shows ion transporting capabilities across lipid bilayer membranes and biological activity against bacteria and yeast. This molecule has a low critical micelle concentration of $6.3 \times 10^{-4} \text{ M}$ compared to its common $C_{12}$ analogues. The unfunctionalised amphiphilic crown ether shows a cmc value of $2.5 \times 10^{-3} \text{ M}$. This cage surfactant forms stable monolayers in solution and shows specific interaction with $\text{Mg}^{2+}$ in solution. Surface pressure isotherms with Group I and Group II metal solution subphases indicate increasing interaction of the crown moiety with $\text{Ca}^{2+}$, $\text{Na}^{+}$, $\text{K}^{+}$, $\text{Li}^{+}/\text{Ba}^{2+}$ and $\text{Mg}^{2+}$ ions in that order, with mean molecular areas of the effective head group at the surface ranging from $141 \, \text{Å}^2$ to $219 \, \text{Å}^2$. Wormlike micelles and vesicles are observed with atomic force microscopy after multilayer Langmuir Blodgett film deposition on a glass substrate.  

**Keywords:** Surfactant, sarcophagine, ion channel, supramolecular chemistry, macrocycle.