MASTER'S THESIS

# Encapsulation of magnetosomes in lipid vesicles

Liu, Shuk Yi

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# Encapsulation of Magnetosomes in Lipid Vesicles

LIU Shuk Yi

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Principal Supervisor: Dr. HU Gang

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## Abstract

Usual magnetoliposomes are giant lipid vesicles filled up homogeneously with an aqueous ferrofluid and suspended in a nonmagnetic aqueous phase. Using double emulsification techniques, we have developed a method to encapsulate ferrofluid emulsion droplets into giant lipid vesicles. By transferring the double emulsion (O1/W/O2) droplets originally suspended in an oil phase into a water phase, we are able to assemble asymmetric vesicles containing monodisperse submicron-sized emulsion droplets, which are made of an oil-based ferrofluid. The stability of the system against a changing environment is enhanced by the compartment structure. Under a magnetic field, the ferrofluid emulsion droplets inside a vesicle form magnetosomes and induce a large shape deformation of the vesicle. We describe our process to prepare double emulsions with a controlled size distribution and the flexibility to assemble lamella vesicles by two independently-formed monolayers. Results of the magnetic field-dependent shape transformation, stability of the bilayers of vesicles under shear flow and ionic strength situation are reported. The application of encapsulation of active particles in vesicles facilitates further investigations of physical properties of biological membranes and is aimed to improve drug delivery and cosmetics products.

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