

PREPARATION OF MAGNETO-VESICLES WITH DOPE/DDAB LAYERS

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INTRODUCTION: Biocompatible magneto-vesicles have very good dispersibility in aqueous solution, as well as affinity to the cell and will be very useful in drug delivery and hyperthermia as magnetic carriers [1-3]. Vesicles with Dioleoyl phosphatidylethanolamine (DOPE) and dimethyl dioctadecylammonium bromide (DDAB) as bilayers and magneto-vesicles consisting of the same bilayers, with magnetite nanoparticles as cores, were prepared by the sonication method. The morphologies and size distributions of DOPE/DDAB vesicles and magneto-vesicles were characterized by AFM.

METHODS: A series of DOPE/DDAB in chloroform stock solution was mixed at different concentration ratios. The mixture of phospholipids was dried under nitrogen in a flask and was desiccated in vacuum overnight to remove the residual solvent in the dried film. A drop of magnetic fluid was added to the dried film and the sample was incubated for 2 hours. The vesicle suspension was sonicated to clarity for 40 min in a sonicator. The resulting solution of magnetic vesicles was stored at 4°C.

RESULTS AND CONCLUSION: The vesicles with different concentration ratios of DOPE and DDAB were prepared at different temperatures and pH values. We found that the aqueous vesicle suspension with DOPE to DDAB ratio of 1:1 is very stable. With DOPE/DDAB (1:1, wt%) as surfactant magneto-vesicles were synthesized using magnetite nanoparticles ($D_m = 9$ nm, Fig.1) as the cores.

From AFM measurements, the size distributions of vesicles and magneto-vesicles can be described by a log-normal function [4]. The average sizes of vesicles and magneto-vesicles are 316 nm and 311 nm, respectively.

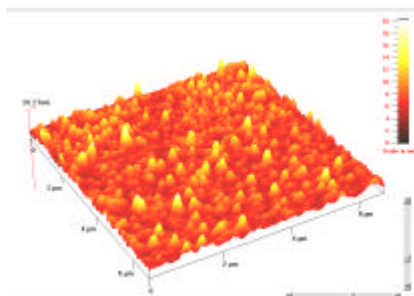


Fig. 1: AFM image of magnetic nanoparticles.

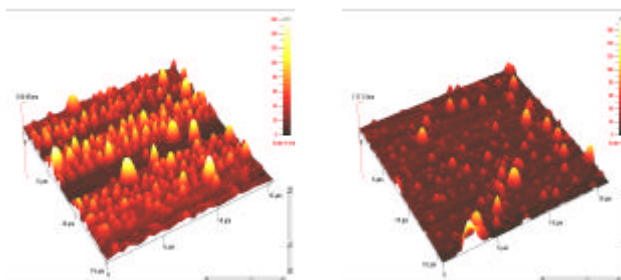


Fig. 2: AFM images of DOPE/DDAB (1:1, wt%) vesicles (left) and magneto-vesicles (right).

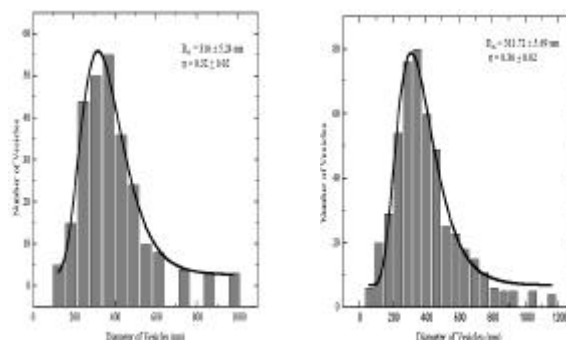


Fig. 3: Size distributions of DOPE/DDAB (1:1, wt%) vesicles (left) and magneto-vesicles (right).

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