

Faculty of Engineering

Summer Research Program 2024-2025

Project Title: **Lipidic nanoparticles for antimicrobial peptide delivery**

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Objective

The objective of this research is to use lipid-based nanoparticles for antimicrobial peptide delivery and to identify their abilities of eradicating multi-drug resistant bacteria.

Project Details

Gram-negative bacteria have caused substantial multi-drug resistance (MDR) in both clinical and community settings. Antimicrobial peptides (AMPs), with low cytotoxicity and broad-spectrum antimicrobial activity, have been recognized as prominent candidates to overcome MDR infections. However, AMPs may suffer from instability and inactivation by the proteases in the organism, so that the administration route is limited to topical use. Lipidic nanoparticles (cubosomes)

offer unique cubic structure to protect AMPs from harmful environment and controlled delivery to the target site. In this project, candidates will be able to prepare cubosomes and incorporate appropriate AMPs in cubosomes that target a variety of Gram-negative bacteria. The therapeutic efficacy will be evaluated by *in vitro* experiments, *i.e.*, minimum inhibitory concentration and time-kill assay. During this process, the candidates will be able to prepare media solutions and subculture bacterial isolates, and perform susceptibility testing efficiently.

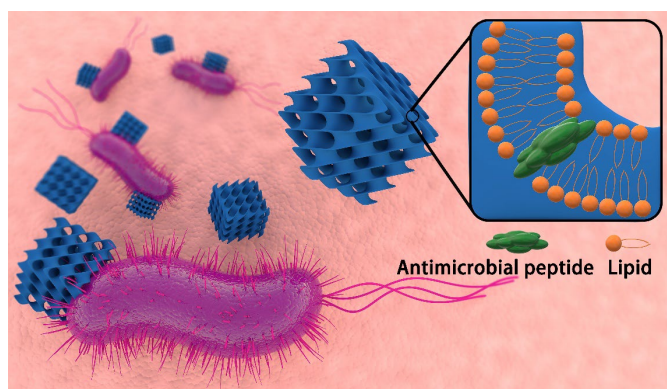


Figure. An illustration of AMP-loaded cubosomes attached to Gram-negative bacteria. The insert image demonstrates AMP loading in cubosome structure.