

Biomedical Applications Of Model Membranes

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All living organisms rely on membranes that act as selectively permeable barriers controlling movement in and out of cells. Model systems such as tethered-bilayer lipid membranes (tBLMs) can be designed to replicate the fundamental structure and function of their biological counterparts. This creates a simplified pathway for determination of the effects that antimicrobial medicines can have on cell membranes, as well as opening the door for the development of membrane-based biosensors. The formation of tBLMs involves the binding of tethering amphiphilic lipids to a gold surface to create a monolayer tightly bound through gold-sulphur interactions. Further lipid addition results in a highly stable bilayer design that can be used to mimic bacterial or eukaryotic cell membranes. The structure of tBLMs and how they change when exposed to antimicrobials and other molecules can be analysed using electrochemical impedance spectroscopy and neutron reflectometry. Resistive and capacitive properties of a model membrane can be approximated with an electrical circuit modelling impedance spectroscopy data, whilst neutron reflectometry provides a layer-by-layer profile of the membrane's core structure.

This work focuses on the use of these techniques to show 1) how pre-treating a model gram-negative bacterial membrane with gold nanoparticles can increase the efficacy of the antibiotic colistin, 2) how model membranes could be used as a more effective screening mechanism for determining efficacy of antimicrobial polymers and 3) how the stability of model membranes can be effected by temporary dehydration through removal of electrolyte solution.

Level of Expertise

Student

Speakers Gender

Male

Do you wish to take part in the poster slam

No

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