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Title

From protocells to fighting the novel coronavirus

Abstract

Synthetic cell research is aimed at the de novo design of a system that displays all the hallmarks of life: metabolism, reproduction, and compartmentalization. Compartmentalization is the separation of a cell or organelle from its outer environment with a lipid bilayer membrane, and is key to life in that it enables complex, multi-step reactions to happen in a highly efficient manner.

Liposomal-based systems have been the backbone of synthetic cell research, however, they are inherently dynamic and less stable than polymer based systems. Polymersomes are comprised of larger, generally more chemically inert amphiphilic block copolymers which allow the generation of new, interesting structures that are thermodynamically stable and allow membrane-bound phenomena to be studied on longer timescales.¹

In this presentation I will highlight some of work on using polymersomes as an alternative to liposomes to develop protocellular systems mimicking key functions of biology ranging from asymmetry in shape,²⁻⁵ incorporation of biological components⁶ and generating/compartmentalising chemical energy.⁷⁻⁸

Unexpectedly, our work on amphiphile-based nanoparticles turned out to be beneficial in terms of being able to communicate effectively to a non-scientific audience why soap is good at destroying the novel coronavirus SARS-CoV-2.⁹ I will explain in this presentation how the action of ordinary soap on viruses gives us a powerful clue towards how systems chemistry could be applied for medical applications.

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