The development of Supramolecular Self-associating Amphiphiles (SSAs) towards the treatment of both infectious disease and cancer.... plus a surprise, can you stop a bullet with protein?

Jennifer R. Hiscock

School of Natural Sciences, Ingram Building, University of Kent, UK, CT2 7NH

E-mail: J.R.Hiscock@kent.ac.uk

Our novel patented (European Patent Application No. 18743767.8, U.S. Patent Application No. 16/632,194), Supramolecular Self-associating Amphiphiles (SSAs) technology incorporates a library of ~ 190 amphiphilic salts and associated compounds. The anionic component of this class of compounds have been shown to self-associate through the formation of intermolecular hydrogen bonds producing anionic dimers in the polar organic solvent DMSO. Moving into aqueous conditions, SSAs self-associate to form spherical aggregates between 100 nm and 550 nm in hydrodynamic diameter. However, the presence of inorganic salt can cause these spherical aggregates to morph from sphere to fibre, producing a series of hydrogel materials.

Within a biological context we have shown these SSAs to:

1. act as antimicrobial[1] and antibiofilm agents;[2]
2. increase the efficacy of other antibiotic/antiseptic agents and anticancer agents against bacteria[3] and ovarian cancer cells respectively;[4]
3. selectively interact with phospholipid membranes of different compositions;[5]
4. have the potential to act as drug delivery vehicles;[6]
5. exhibit a druggable profile when delivered via i.v. in vivo to mice.[7]

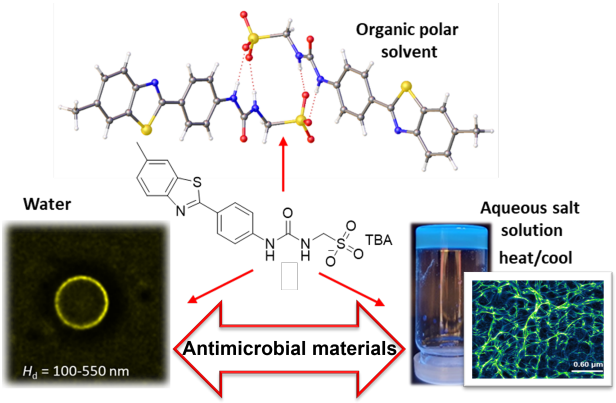

Figure 1. An example SSA and the self-associated structures produced under different environmental conditions. TBA = tetrabutylammonium.

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Jennifer Hiscock is a Professor of Supramolecular Chemistry (2022) and UKRI Future Leaders Research Fellow in the School of Natural Sciences at the University of Kent (UK). She studied for a PhD in the group of Prof. Phil Gale at the University of Southampton and carried out postdoctoral research in the same group until 2015. Following this she moved to the University of Kent as the Caldin Research Fellow in 2015, she was appointed Lecturer in Chemistry in 2016 and Reader in Supramolecular Chemistry in 2019. Her current research interests focus on the development of her patented Talin Shock Absorbing Material (TSAM) and Supramolecular Self-associating Amphiphile (SSA) technologies for real world applications.