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Pore formation by antimicrobial peptides: structural tendencies in bulk and quasi-2D membrane systems VERNITA GORDON, LIHUA YANG, MATTHEW DAVIS, A. SOM, G. TEW, GERARD WONG, Department of Materials Science and Engineering, Dept. of Physics, Dept. of Bioengineering, University of Illinois at Urbana-Champaign — Antimicrobial peptides are cationic, amphiphilic structures that are key components of innate immunity. A prototypical family of synthetic analogs are the phenylene ethynylene antimicrobial oligomers (AMOs), which have hydrophobic alkyl chains connected to cationic hydrophilic regions. Synchrotron small-angle x-ray scattering (SAXS) shows that when AMO is mixed with concentrated model membranes, initially in the form of Small Unilamellar Vesicles, the sample forms the inverted hexagonal phase. This is a 3-dimensional phase characterized by a regular array of size-defined water channels. We demonstrate how this structural tendency is expressed when AMOs interact with dilute model membranes in the form of Giant Unilamellar Vesicles (GUVs). Using confocal microscopy, we see that applying AMO to the GUVs causes small encapsulated molecules to be released while large molecules are retained, indicating that size-defined pores have been created. Examining the partial release of polydisperse intermediately-sized molecules allows a closer measurement of the pore size, and there are indications that this single-vesicle microscopy will allow elucidation of the kinetics of the pore-forming process.

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