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Synthetic antimicrobial oligomers induce composition-dependent topological transition in membranes LIHUA YANG, VERNITA GORDON, ABHIJIT MISHRA, KIRSTIN PURDY, JOHN CRONAN, University of Illinois at Urbana-Champaign, ABHIGYAN SOM, GREGORY TEW, University of Massachusetts, GERARD C.L. WONG, University of Illinois at Urbana-Champaign —
Antimicrobial peptides comprise a key component of innate immunity for a wide range of multicellular organisms. Recently, their synthetic analogs have demonstrated broad-spectrum antimicrobial activity via permeating bacterial membranes selectively, although the precise molecular mechanism underlying the activity is still unknown. We systematically investigate interactions and self-assembled structures formed by model bacterial membranes and a prototypical family of phenylene ethynylene-based small molecule antimicrobials with controllable activity and selectivity. Synchrotron small angle x-ray scattering (SAXS) results correlate antibacterial activity and the induced formation of an inverted hexagonal phase, and indicate that the organization of negative curvature lipids such as DOPE are crucially important. Preliminary killing assays of DOPE-deficient mutant bacteria agree with the x-ray results.

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