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Membrane permeation of self-adapting metaphilic peptides MING HAN, Northwestern University, MICHELLE LEE, GERARD WONG, University of California, Los Angeles, ERIK LUIJTEN, Northwestern University — Amphiphilic surface patterns, with both hydrophobicity and cationic charge, are crucial characteristics of antimicrobial peptides (AMPs), assisting in permeating and remodeling bacterial membranes. Like proteins, traditional AMPs often have solid-like surfaces due to strong hydrogen bonding or hydrophobicity. Here we demonstrate that adaptability of liquid-like surfaces can significantly enhance membrane-permeating activity of AMPs. These metaphilic peptides have a bottlebrush architecture consisting of a rigid core decorated with mobile, hydrophobic side chains that are terminated with cationic groups. Using molecular dynamics simulations, we find that the flexible side chains can undergo significant rearrangement when interacting with a lipid membrane, endowing the peptide with adaptable surface chemistry.

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