Buckled Membranes in Mixed-Valence Ionic Amphiphile Vesicles

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This group of scientists has discovered a new mechanism by which charged molecules, including molecules with biological motifs, organize themselves in closed shells. Their work illuminates the question of how molecules that are assembled in a liquid state can form shapes expected for elastic membranes, such as faceted vesicles. Their theoretical and experimental results show that the supramolecular shape, which has its roots in intermolecular interactions, generates non-spherical structures. Specifically, they demonstrate that anionic and cationic amphiphiles of unequal charge can co-assemble into small buckled vesicles, and provide a physical argument to explain this phenomenon. The strong electrostatic interaction between the +3 and -1 head groups increases the cohesion energy of the amphiphiles and favors the formation of two-dimensional, flat ionic domains on the vesicle surface, resulting in edges and a buckled shape.