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Versatile Assemblies of Zwitterionic Giant Surfactants Toward Two-dimensional "Nano-disks". STEPHEN CHENG, ZHIWEI LIN, JIAN SUN, WEI ZHANG, The University of Akron, CHENG RESEARCH GROUP TEAM — Two-dimensional (2D) structures and materials have sparked considerable interests because of their unique dimension-dependent optical, mechanical and electric properties. Despite the recent significant advances in bottom-up nanoscale fabrication approaches, the preparation of 2D circular shape nanostructures ("nano-disks") has remained a grand challenge. In this work, a specific non-crystallization approach is developed to prepare 2D "nano-disks" by the self-assembly of zwitterionic giant surfactants composed of positively and negatively charged fullerene-based heads tethered by a hydrophobic polystyrene (PS) tail. Deriving from the separation of assembled 3D cylindrical colloids with internal disk stacked structures, the 2D "nano-disks" with uniform diameter and controllable thicknesses are achieved. The 2D "nano-disks" and their 3D cylindrical stacking colloids can be controlled by varying pH value in the solution. These hierarchically assembled structures resemble 2D "nano-disk" thylakoids and their 3D stacking structures of grana within the chloroplasts of plant cells in nature.

Stephen Cheng
Univ of Akron

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