Materials & Chemicals

Gemini Surfactant LLC Membranes from Thiol-Ene Polymerizations

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WARF: P150015US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a more efficient method for synthesizing the kinds of highly desirable surfactants and LLC membranes prized in a range of chemical and industrial fields.

Overview

Lyotropic liquid crystal (LLC) assemblies are useful for highly selective chemical separations, such as water desalination and selective ion-transporting membranes. Bicontinuous cubic LLC assemblies are an especially useful subset because high-symmetry Q-phases, exemplified by the gyroid (G) phase, are ideal for membrane applications.

UW–Madison researchers recently developed a new class of Gemini ("twin-tail") dicarboxylate surfactants that readily form bicontinuous cubic phases, including the gyroid phase (see WARF reference numbers P120009US01 and P120048US02). They continue to refine their methods and materials.

The Invention

The researchers have now developed a new and highly efficient approach for synthesizing crosslinkable Gemini surfactants that can be turned into membranes featuring the desired gyroid morphology.

In the new method, an LLC structure is formed from a mixture containing the functionalized surfactants, a thiol-ene crosslinking agent and a polar solvent. Upon crosslinking, the lyotropic phase morphology is substantially retained.

Applications

- Development of new selective ion-transporting membranes
- Protective clothing
- Filtration, desalination and water purification
- Exchange membranes for fuel cells
- Lithium ion battery separators

Key Benefits

- Streamlines synthesis and potential for roll-to-roll manufacture
- Cuts the number of production steps
- Achieves desired phases over large concentration ranges and temperature windows
- Improves yield
- Utilizes commercially available starting materials

Additional Information

Related Technologies

- For more information about the new family of Gemini dicarboxylate surfactants that readily form bicontinuous LLC phases, see WARF reference number P120009US01.
- For more information about polymerizable analogs of the above surfactants that can be crosslinked to form solid membrane films, see WARF reference number P120048US02.

Tech Fields

- Materials & Chemicals : Polymers
- Materials & Chemicals : Synthesis

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854