

Surface Active Ionic Liquid with Activity in Aqueous and Non-aqueous Media

Summary

Surface active ionic liquids (SAILs) exhibit extraordinary properties both as solvents and superior surfactants. However, existing SAILs have limitations that prevent their full potential from being realized. To address this, researchers at Vanderbilt have synthesized a promising chiral SAIL that can be used as a detergent or stabilizing agent at all kinds of interfaces and is made from an inexpensive and biodegradable starting material.

Addressed Need

Although there are numerous benefits associated with SAILs, their utility is hindered by several factors including their limited ability to dissolve in solvents of varying polarity, such as water and chloroform. Furthermore, existing SAILs that are chiral do not form both micelles and reverse micelles. In fact, even most surfactants cannot form both micelles and reverse micelles.

Technology Description

This novel liquid features an unprecedented combination of characteristics not found in other ionic liquids (ILs). The most important of these characteristics is its ability to dissolve in both hydrogen bonding (water) and non-hydrogen bonding (chloroform) solvents and forms anionic chiral micellar aggregates (CMAs) and reverse-CMAs, at very low concentrations. These characteristics qualify the newly discovered chiral SAIL as the rarest detergent or stabilizing agent and can efficiently work at all kinds of interfaces.

Unique Features

- Dissolves in both hydrogen bonding (water) and non-hydrogen bonding (chloroform) solvents
- First ionic liquid that forms anionic chiral micellar aggregates (CMAs) and reverse-CMAs, at very low concentrations
- The starting material for its synthesis is inexpensive and biodegradable.

Applications

Useful as an additive for oil-based formulations such as fuel injector cleaners, moisture trapping agents in fuels, carburetor cleaners, and engine oils (lubricants) that require a surfactant/stabilizer. Also useful for conventional applications related to water based coatings and formulations in the drug and agriculture space.

Technology & IP Status

The material has been synthesized, fully characterized, and used in representative applications. A patent application was filed.

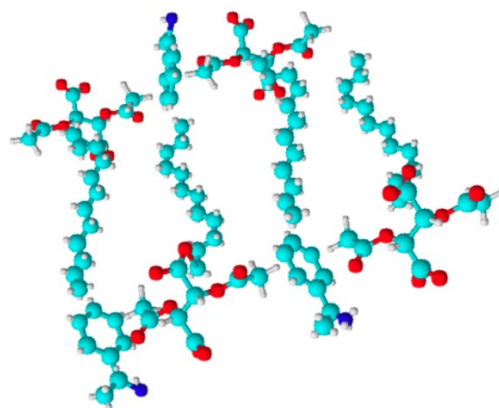


Figure 1: A rendering of the micellar arrangement for the novel, synthesized material is shown.

CTTC CONTACT:

Masood Machingal, Ph.D.
(615) 343-3548
masood.machingal@vanderbilt.edu

INVENTORS:

Prasad L. Polavarapu, PhD
Vijay Raghavan, PhD

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