



Contribution ID : 118

Type : Poster

Self-Assembly of Carbon Dioxide Nonionic Surfactants in Ionic Liquids

Thursday, 25 November 2021 18:33 (1)

The diverse and tuneable intermolecular interactions present in ionic liquids (ILs) make them excellent media for surfactant self-assembly. Previous studies of polyoxyethylene alkyl ether nonionic surfactants, in ethylammonium nitrate and propylammonium nitrate have shown they can support the full range of amphiphilic self-assembly behaviour of nonionic surfactants for various applications. However, the head group of these nonionic surfactant, ethylene oxide (EO), is a petrochemical product, prompting us to seek bio-renewable substitutes, amongst which carbon dioxide stands out. Recent studies of nonionic surfactants incorporating CO₂ (partly substituted for EO) have shown they are promising surface-active molecules. Small angle neutron scattering (QUOKKA, ANSTO) showed a single CO₂ unit per surfactant can have an enormous impact on phase behaviour of dodecyl surfactants in water. The formation of gel-like liquid crystalline phases was completely suppressed through reduced hydration of the headgroups. This study is directed at understanding self-assembly behaviour of CO₂ nonionic surfactants in ILs. We have examined the structure of surfactant-IL solutions using small angle neutron scattering as a function of surfactant concentration, solvent composition and temperature. Results shown that unlike water, solvation of nonionic headgroup is mostly unaffected by incorporation of CO₂ units in pure ILs. However, this can be easily regulated through water dilution or mixing ILs. This demonstrates the composition of surfactant headgroup and the solvent can be used as tools to engineer solvent-headgroup interactions in formulating non-aqueous soft matter.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

Which facility did you use for your research

Australian Centre for Neutron Scattering

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

Primary author(s) : MIAO, Shurui (The University of Sydney)

Co-author(s) : GRADZIELSKI, Michael (TU Berlin); WARR, Gregory (The University of Sydney)

Presenter(s) : MIAO, Shurui (The University of Sydney)

Session Classification : Poster Session

Track Classification : Chemistry, Soft Matter & Crystallography