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Biocompatible ionic liquids as designer solvents for the formation of non-lamellar lyotropic liquid crystalline nanoparticles as drug delivery vehicles

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Ionic liquids (ILs) have emerged as a remarkable class of green solvents with unique characteristics, and feasible task-specific tailoring of their properties. The application of ILs has extended to facilitate amphiphile self-assembly. ILs not only support the self-assembly of amphiphiles, they can also be used as designer solvents(1).

Lipid amphiphiles can assemble into a wide range of lyotropic liquid crystalline mesophases possessing unique highly ordered multidimensional structures. The bulk phases can be further broken into nanoparticle dispersions (LCNPs), for examples cubosomes and hexosomes, that are characterised by their high surface to volume ratio. These particles are receiving growing interest due to their great potential as drug delivery vehicles for both hydrophilic and hydrophobic drugs(2).

Our recent small angle X ray scattering (SAXS) results revealed a wide range of LCNPs such as cubosomes and hexosomes obtained in various biocompatible ILs-water solvents. A strong correlation exists between the pH of the solutions and the adapted phases.

References:

1. Zhai, J.; Sarkar, S.; Tran, N.; Pandiancherri, S.; Greaves, T. L.; Drummond, C. J., Tuning Nanostructured Lyotropic Liquid Crystalline Mesophases in Lipid Nanoparticles with Protic Ionic Liquids. *The Journal of Physical Chemistry Letters* 2021, 12 (1), 399-404.
2. Zhai, J.; Fong, C.; Tran, N.; Drummond, C. J., Non-Lamellar Lyotropic Liquid Crystalline Lipid Nanoparticles for the Next Generation of Nanomedicine. *ACS Nano* 2019, 13 (6), 6178-6206.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

He/Him

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

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