



Contribution ID: 113

Type: Oral

SAXS investigation of protic ionic liquid-water mixtures, and their application to protein crystallisation

Friday, 26 November 2021 15:25 (15 minutes)

Protic ionic liquids (PILs) are cost efficient “designer” solvents which can be tailored to have properties suitable for a broad range of applications. PILs are also being combined with molecular solvents to enable more control over the solvent environment, driven by a need to reduce their cost and viscosity. This also leads to greater biocompatibility.

In this presentation I will discuss our ongoing work into designing PIL solvents for proteins, with a focus on lysozyme as a model protein 1. We have recently been using SAXS to explore the effect of PILs on lysozyme from dilute to neat IL concentrations in water. This naturally leads to a discussion on the difficulties in obtaining SAXS data of proteins in viscous media, and of analysis the data where the solvent is also nanostructured. However, despite these challenges, we are beginning to develop design rules which can be used to select ILs for specific applications.

One application that we are developing PIL solvents for is in protein crystallisation. We have used MX1&2 data to solve lysozyme crystal structures with 7 PILs present. Preliminary results will be presented where we have used SAXS to monitor the initial stages of lysozyme crystallisation in PIL-water solutions, using ethylammonium nitrate as the PIL.

1. Qi, H.; Smith, K. M.; Darmanin, C.; Ryan, T. M.; Drummond, C. J.; Greaves, T. L., Lysozyme conformational changes with ionic liquids: spectroscopic, small angle x-ray scattering and crystallographic study. *Journal of Colloid and Interface Science* 2021, 585, 433-443.

Presenter Gender

Woman

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

Students Only - Are you interested in AINSE student funding

Level of Expertise

Experienced Researcher

Pronouns

She/Her

Which facility did you use for your research

Australian Synchrotron

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Session Classification: Chemistry, Soft Matter & Crystallography

Track Classification: Chemistry, Soft Matter & Crystallography