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Investigation of Structure-Property Relationship Between Protic Ionic Liquids (PILs) and Biomolecules

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Protic ionic liquids (PILs) are increasingly being used as solvents for biological molecules due to their desirable properties. Biomolecules such as amino acids, peptides and proteins can be easily destabilized by small changes in their molecular interactions with solvents or solutes. In this study, the structure-property relationship between all 20 amino acids and 7 different peptides will be investigated in a broad range of PILs.

The PILs will comprise of alkyl ammonium cations combined with organic or inorganic anions. They will be synthesized based on an acid-base reaction by using conventional and high throughput methodology. The resulting PILs will then be characterized in terms of their key physicochemical and solvent properties by a number of experimental and instrumental analysis such as density, viscosity, conductivity measurements, thermal properties and spectrophotometry using NMR, SAXS/WAXS and DSC. Next, a detail solubility studies will be conducted for all amino acids and peptides in all of those PIL combinations. These biological molecules in PIL solvents will also be characterized via instrumental analysis such as SAXS/WAXS, DSC, FTIR and CD, respectively. This will enable the role of changing PIL cations and anions on amino acid and peptide stability to be quantified.

As a more general outcome of this study, design rules for stabilising functional biomolecules in PIL based solvents will be developed.

Keywords or phrases (comma separated)

ionic liquids, solvation, biomolecules, protein stability, molecular interactions

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Yes

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Yes

Are you an ECR? (<5 yrs since PhD/Masters)

Yes

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Female

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