CICLO DE SEMINARIOS 2022-2023
DEPARTAMENTO DE QUÍMICA FÍSICA
UNIVERSIDAD COMPLUTENSE DE MADRID

Viernes 18 de noviembre de 2022 – 11:30 h
Aula QC04

Tailoring the properties of deep eutectic solvents to control supramolecular assemblies, colloidal interactions, and protein conformation

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In recent years, deep eutectic solvents (DESs) have emerged as environmentally friendly alternatives in different technologies, such as separation processes, synthesis of nanostructured materials, and biocatalysis [1]. DESs are green solvents obtained through the combination of cheap and simple organic compounds, where a depression in the melting point allows the mixture to remain liquid at room temperature. Moreover, the combination of different precursors provides fine control over the physicochemical properties of the solvent (e.g., solvent polarity and charge density). Thus, DESs are task-specific "cocktails", where the properties of the solvent can be tuned to suit particular applications. DESs have shown the ability to support ubiquitous physicochemical processes that occur in water, such as the supramolecular assembly of amphiphilic molecules and protein folding [2]. This brings the possibility of developing new technologies in responsive systems and biomaterials. In this seminar, I will present our results on the supramolecular assembly of surfactants as dictated by the physicochemical properties of the DESs, hydrotrope addition, and counterion substitution [3,4]. Also, we will visit our recent investigations on how DESs can control the folding of proteins, with the possibility of stabilising specific intermediate folding states [5]. Overall, we will walk through the fundamentals of self-assembly and folding in DESs, where solvophobicity, specific ion interactions, and electrostatics rule a world of infinite possibilities.

[1] Hansen *et al.*, Deep Eutectic Solvents: A Review of Fundamentals and Applications. *Chem Rev* **2021,** *121* (3).
[2] Warr and Atkin, Solvophobicity and amphiphilic self-assembly in neoteric and nanostructured solvents. *Current Opinion in Colloid & Interface Science* **2020,** *45*.
[3] Sanchez-Fernandez *et al.*, Complex by design: Hydrotrope-induced micellar growth in deep eutectic solvents. *J. Colloid Interface Sci.* **2021,** *581* (Pt A).
[4] Sanchez-Fernandez *et al.*, Long-range electrostatic colloidal interactions and specific ion effects in deep eutectic solvents, *J. Am. Chem. Soc* **2021**, *143* (35).
[5] Sanchez-Fernandez *et al.*, Deep eutectic solvents for the preservation of concentrated proteins: the case of lysozyme in 1:2 choline chloride:glycerol. *Green Chem.* **2022,** *24* (11).

Se ruega enviar un correo a smarggi@ucm.es si se está interesado en acceder vía telemática.