

Water based solutions for biorefineries

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On the quest for more sustainable processes of biomass fractionation water should, whenever possible, be the solvent of choice. Its limitations as a solvent towards a large number of compounds that range from the hydrophobic lignin and lignin fractions, phenolics and dyes to the most hydrophilic compounds such as cellulose, require that water properties are modified by physical means (e.g. temperature) or chemical additives (e.g. salts, hydrotropes, surfactants...). Novel solvents such as ionic liquids, eutectic systems or biosolvents all benefit of being used in aqueous solution, which minimizes their economic and environmental impact on the process, but also often improves their solvation ability and transport properties.

In this communication we will show how aqueous solutions can be used for biomass fractionation, and aqueous biphasic systems as stimuli-responsive media for biocompounds purification or conversion. We will present examples addressing both lignocellulosic and marine biorefineries, showing how not only wood, but also algae and fisheries waste streams can become the basis for a biorefinery, and a source of valuable natural compounds. These examples will highlight the potential of aqueous solution of green solvents, and will allow to discuss the molecular mechanisms behind their enhanced solvation performance when compared to their pure forms.