Design and evaluation of polarity controlled and recyclable deep eutectic solvent based biphasic system for the polarity driven extraction and separation of compounds

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Deep eutectic solvent (DES) based extraction methods have promising applications in extracting and separating compounds from plants. In this study, a polarity controlled biphasic extraction system consisting of a hydrophilic DES phase (Hexafluoroisopropanol-choline chloride) and a hydrophobic DES phase (Menthol-tricaprylylmethylammonium chloride) was constructed. The DES based biphasic system was successful in the simultaneous extraction and separation of high polarity compounds, such as chlorogenic acid, quercetin and anthocyanidins, and a low polarity compound artemisinin, from Artemisia annua Leaves in a single step by the polarity driven recognition targets. By adjusting the mole ratio of the component in each DES phase, the HFIP-ChCl(1:1)/Menthol-N8881Cl(2:1) biphasic system showed the best extraction and separation performance. COSMO-RS was used to monitor and analyze the changes in the surface polarity dynamics of each DES. Therefore, the polarity controlled DES based biphasic extraction system was used to expand the application of DESs in the extraction and separation of bioactive compounds with various polarities