Innovative alternative dyeing of textiles with Ionic liquids or Deep Eutectic Solvents – A critical reflection

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Textile wet processing, including pre-treatment, dyeing and finishing, is commonly carried out with water as solvent and is of high environmental concern due to the generation of high volumes of polluted effluents. During the last two decades, ionic liquids (IL) and Deep Eutectic Solvents (DES) have gained increasing interest and extensive research has been carried out by the scientific community with these liquids because of their special properties such as low melting point, high solvation capacity, negligible vapor pressure and the possibility to recover and recycle them after the process. While IL are salts composed of an organic cation and an inorganic or organic cation, DES are composed of a hydrogen bonding acceptor (HBA) and a hydrogen bonding donor (HBD), mostly cheap substances of natural origin such as urea, choline, sugars or organic acids. The properties of IL and DES can be adjusted for a wide range of applications with the right anion/cation or HBA/HBD combination. The use of ionic liquids as solvents for textile dyeing was first registered in the work of Knittel and Schollmeyer in 2007. Since then a few literature reports have reported on the successful use of IL as interesting alternative to solvents or textile auxiliaries. We have investigated the use of IL and DES in the dyeing of different textile materials and a critical comparison of our results to literature reports will be given.