



	<b>Experiment title:</b> Asymmetric ion solvation in critical solvents	<b>Experiment number:</b> SC-4140
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Report:

Recently observed anomalous interactions in critical binary aqueous solvents containing hydrophilic salt [1,2] have sparked significant interest, where one of the suggested mechanisms is governed by the unequal cation and anion partitioning due to their asymmetric solvation preferences [3]. However, such preferential ion solvation in critical water-oil mixtures has not yet been observed directly in a experiment.

Here we address experimentally the asymmetric solvation of hydrophilic ions in the critical binary mixtures. We probed ion distributions at the liquid-vapour interface of a critical solvent composed of water and 2,6-dimethylpyridine using grazing-incidence x-ray fluorescence (GIXF). We collected data for 10 mM of added hydrophilic potassium chloride (KCl) and at several degrees below the critical temperature ( $T_C$ ). The experiment was carried out using an incident x-ray energy of 8 keV.

Part of the obtained results have been published [4] providing direct experimental evidence for microscopic segregation of hydrophilic ions in the aqueous binary mixtures and therefore indicating the importance of preferential ion partitioning in the mentioned mechanism. Currently, a second manuscript is in preparation for publication, where we show a method of obtaining a relative difference in Gibbs adsorption between salt ions ( $\Delta\Gamma_{\pm}$ ) by applying the GIXF technique. By evaluating the numerical value of  $\Delta\Gamma_{\pm}$  the cation and anion segregation is further highlighted [5].

#### References:

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