Characterization of non-aqueous solvents using liquid jet photo-electron spectroscopy

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ABSTRACT

Since the early 2000 years liquid-jet (LJ) photo-electron spectroscopy (PES) has become a standard method to investigate the electronic structure of solvents and solutes in liquid condensed matter systems. Naturally, liquid water has been the solvent to study (first) due to its importance for humans in general and because of the many applications in particular in physics, chemistry, biology and other sciences. Moreover, these studies have also triggered advances on the experimental side to further miniaturize and to standardize micro-fluidic delivery systems as well as on the theoretical side to develop detailed concepts and computational protocols to model solution phase phenomena.

In this talk, an extension is given how LJ-PES can be used to investigate non-aqueous solvents. The aim is to broaden the perspective onto non-polar (organic) solvents which are abundantly used in synthesis or petrol chemistry. Naturally, for example toluene or octane dissolve many non-polar solutes which are otherwise difficult to dissolve in water.

Furthermore, as a second solvent class, liquid metal alloys will be presented and their electronic structure characterization using LJ-PES methods. In particular, Gallium based liquid metal alloys are used in different applications such as thermometers replacing Mercury, stretchable electronics and robotics, or as a drug delivery agent in medicine. Here, a fundamental study of Gallium as a solvent for tin or indium is given with a perspective to their potential catalytic applications.