Colloquium – University of Vienna

Nanometer Scale Tomography - Including Dynamic Materials

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There are a number of techniques that exist to visualize individual atoms that make up materials which are constantly improving. Atom Probe Tomography (APT) remains however the distinctive technique, which enables chemical maps (on the atomic or even molecular scale) of a particular *volume* of material. With the identification and localization of atom positions in 3-dimensions, APT has been recognized in the characterization of various types of materials, though, until now, most are solid and dense: alloys, nanostructures, dopants, and clustering phenomena can readily be quantified.

Developments at ETH during the last few years have enabled cryogenic transfer of specimens between multiple microscopes, thereby enabling characterization of less solid and therefore 'dynamic materials.' With promising first results of analyzing aqueous solutions [1], the ability to transfer samples from an arrested or vitrified state through to an analytical stage (typically held below 60K) now enables the analysis of materials classes that could not be considered before. In addition, materials with highly diffusive species (therefore dynamic) can be arrested, so that a particular stage of microstructure or chemical dissociation can be measured. This implies that even local chemical variations within liquids may now be measured via APT.

<u>Reference:</u>

[1] Moody M.P., Vella, A., Gerstl S.S.A., Bagot P.A.J. (2016). MRS Bulletin, 41, pp 40-45.