USAXS: A Tool to probe the Structure and Dynamics of Complex Fluids

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For small-angle X-ray scattering (SAXS) experiments requiring high angular resolution and dynamic range, the Bonse-Hart camera [1] is still an attractive technique. The low divergence and high flux of an undulator beam permits to use a crossed-analyser configuration, and obtain the unsmeared high resolution scattering data on an absolute scale (without requiring a calibration standard) within an acquisition time of a few minutes. However, Bonse-Hart double-crystal diffractometers with multibounce channel-cut crystals show rocking curves which depart considerably in their wings from dynamical diffraction theory [2]. The aim of this work is to improve and eventually suppress this parasitic scattering background originating from the surface of the crystals. This will make the ultra small-angle X-ray scattering (USAXS) technique suitable for studying weakly scattering biological samples and very dilute systems such as aerosol particles in a flame. This will be demonstrated using bio-colloids exhibiting hierarchical structures on the nanometer to micron scale. Furthermore, an improved USAXS set-up will allow to perform time-resolved experiments in the USAXS region and to exploit the coherence of the beam for scattering and imaging.

[1] Bonse U., Hart M., *Appl. Phys. Lett*., 1965, 7, 238. [2] Agamalian M., Christen D.K., Drews A.R., Glinka C.J., Matsuoka M., Wignall G.D., *J. Appl. Cryst*., 1998, **31**, 235-240.

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