A unique and novel combination of rheology and X-ray scattering

A new rheometer design allows for the vertical transmission of a monochromatic X-ray beam through plate / plate or cone / plate geometries.

Advantages of the design:
- a and b orientations - otherwise impossible to probe with plate/plate geometry - are accessible:

More advantages:
- plate/plate: No loading problems with high viscosity materials (polymers...)
- No averaging of velocity or velocity gradient directions
- The normal direction is accessible for Couette geometry

Design available from 2012 on
Parameters and Availability

Parameters

The rheometer is a modified Thermo Fisher MARS II in inverted geometry. The rheometer is stress controlled and allows for all rheological tests and experiments possible with a standard MARS II rheometer.

For plate/plate geometry: Viscosity : ~ 0.1–1000 Pas, shear rate: ~ 0.002–2700 s⁻¹, max. torque: 200 mNm

Samples can be measured from 10° C to 250° C. A cooling option is planned.

The sample volume needed for one experiment is typically in the range of 0.2 to 1 ml.

External electric and magnetic fields will be optionally available in the future.

Pilatus 100K and 300 K detectors available

XPCS (X-ray photon correlation spectroscopy) option under commissioning

Access

A preliminary setup is installed at Petra III. A developed design is planned for 2012.

The setup is available for external users via the standard proposal procedures at DESY (www.desy.de). Technical, experimental and scientific support is provided for external users.

Contact

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Observation of New States of Liquid Crystal 8CB under Nonlinear Shear Conditions as Observed via a Novel and Unique Rheology/Small-Angle X-ray Scattering Combination
Struth Bernd; Hyun Kyu; Kats Efim; et al, LANGMUIR, 27, 6, 2880-2887, 2011