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Anomalous response of nematic platelets under LAOStress and Strain revealed by 3D RheoSAXS O. KORCULANIN, ICS-3, Forschungszentrum Juelich, Germany, H. HIRSEMANN, B. STRUTH, DESY, Hamburg, Germany, G. PORTALE, Uni. of Groningen and Dubble, ESRF, Grenoble, France, M. P. LETTINGA, ICS-3, Forschungszentrum Juelich, Germany and KU Leuven, Belgum — Dispersions of colloidal Gibbsite platelets in the nematic phase display a complex response to Large Amplitude Oscillatory Shear (LAOS) flow that strongly depends on the strain amplitude. [1] In this work we applied LAOStress and LAOStrain to the nematic dispersion and probed the structure with time-resolved SAXS measurements. By using plate-plate and couette geometry, we had access to both the flow-vorticity and flow-gradient plane, respectively, thus obtain full 3D rotational motion of the director. For LAOStress, we observe strong asymmetrical behavior both in the rheological and the microscopic response. This asymmetry is connected to the yielding behavior of the platelets. By increasing the stress amplitude we observed that the response becomes more symmetric; however, this strongly depends on the frequency, hence the time necessary for the system to yield. Softening of the response towards the center of the gap was observed by scanning the gap while performing LAOStrain. The structural response at low strain amplitude does not propagate throughout the gap, where as at high strain amplitudes the response in the bulk emerges as erratic. [1] M. P. Lettinga, et al., Non-linear behavior of colloidal platelets in shear flow. Phys. Rev. Lett.(2012) Vol. 109, 246001

Olivera Korculanin
ICS-3, Forschungszentrum Juelich, Germany

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