



Structural evolution of a model colloidal gel in a simple shear field

Dienstag, 17. September 2024 22:40 (20 Minuten)

Colloidal gelation, where colloidal scale particles aggregate and form a network, is a fundamental process with industrial relevance.(Jadrich et al., 2023) Following from our previous work on the structure formed by a simple system of gelling colloidal particles in a Couette shear field(de Campo et al., 2019, Muzny et al., 2023) we study the time evolution of the structure over an extended range of scattering vectors, $3 \times 10^{-4} \text{ nm}^{-1} < q < 3.1 \times 10^{-1} \text{ nm}^{-1}$. This range of scattering vectors contains information about the individual nano-scale sol particles and the network formed by the gelling particles. Two instruments at the Australian Centre for Neutron Scattering (Lucas Heights, Australia) were utilized: conventional pinhole SANS (BILBY(Sokolova et al., 2016)); and slit smeared intensity from a Bonse-Hart USANS (KOOKABURRA)(Rehm et al., 2018). Gelation was initiated from a model system of silica nanoparticles where a slight adjustment of the pH modulated interparticle interactions. In the absence of shear we observe that the sol rapidly increases in viscosity until flow is arrested, in the case of an applied shear we observe that viscosity rapidly increases until it reaches a maximum, and then viscosity decreases. Scattering curves at constant shear rate were modelled to yield the growth and volume fraction of clusters. Derived structural parameters were used to calculate viscosities from a simple theoretical model(Gillespie, 1983) which gives excellent agreement with measured viscosities.

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Muzny, C., L. de Campo, A. Sokolova, C. J. Garvey, C. Rehm, and H. Hanley. 2023. Shear influence on colloidal cluster growth: a SANS and USANS study. *Journal of Applied Crystallography* 56(5).

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Soft Matter