LAOS Rheo-NMR

Joseph D. Seymour
Chemical and Biological Engineering, Montana State University, Bozeman MT USA

Material property characterization often uses rheology, which involves measuring the material response to deformation and flow, since the processing and function of many materials depend on their behavior under deformation or flow. Soft matter physics in general deals with systems that are complex due to the scale of the polymers, colloids, particulates or multiple phases of which they are composed [1,2]. Soft matter materials underlie many systems encountered in daily life from food to health and personal care products. The dissipative, heterogeneous and non-equilibrium nature of the microscale dynamics in most soft matter systems impact the macroscale material response, generating rheological responses that depend on microstructure. In many processing and application environments large amplitude and oscillatory shear forces are applied to materials. This has led to development of large amplitude oscillatory shear (LAOS) rheometry methods [3,4]. Using NMR and MRI velocimetry, spectroscopy and relaxometry to study materials under shear is well established and termed Rheo-NMR [5]. Here the application of Rheo-NMR methods during LAOS in a Couette flow cell is demonstrated and a means of analysis considered, using fluids exhibiting a range of rheological responses, *i.e*. Newtonian viscous, yield stress, shear thinning, thixotropic [5].

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