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Dielectric Rheo-SANS: An Instrument for the Simultaneous Interrogation of Rheology, Microstructure and Electronic Properties of Complex Fluids[1] NORMAN WAGNER, Univ of Delaware, JEFFREY RICHARDS, Univ of Delaware NCNR NIST, JULIE HIPP, Univ of Delaware, PAUL BUTLER, Univ of Delaware and NCNR NIST — In situ measurements are an increasingly important tool to inform the complex relationship between nanoscale properties and macroscopic measurements. For conducting colloidal suspensions, we seek intrinsic relationships between the measured electrical and mechanical response of a material both in quiescence and under applied shear. These relationships can be used to inform the development of new materials with enhanced electrical and mechanical performance. In order to study these relationships, we have developed a dielectric rheology instrument that is compatible with small angle neutron scattering (SANS) experiments. This Dielectric RheoSANS instrument consists of a Couette geometry mounted on an ARES G2 strain controlled rheometer enclosed in a modified Forced Convection Oven (FCO). In this talk, we outline the development of the Dielectric RheoSANS instruments and demonstrate its operation using two systems - a suspension of carbon black particles in propylene carbonate and poly(3-hexylthiophene) organogel - where there is interest in how shear influences the microstructure state of the material. By monitoring the conductivity and rheological response of these materials at the same time, we can capture the entire evolution of the material response to an applied deformation.

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