

Super-heterodyne Doppler Light Scattering under Multiple Scattering Conditions

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Multiple scattering (MS) is a plague to dynamic light scattering studies intended to cover broad ranges of particle concentrations. We here report a novel empirical correction scheme for multiple scattering (MS) in Super-Heterodyne Doppler-Velocimetry. We find that due to detection volume and angle restriction in our home-built low angle reference beam configuration, MS is of moderate intensity even at sample transmission as low as 40% (Fig.1). The remaining MS signal is excellently approximated as a Lorentzian and can be subtracted from the raw power spectra. From the noise and MS corrected spectra of charged sphere suspensions subjected to DC electric fields we can infer the electro-kinetic properties of particles and cell walls. We further use our scheme for measurements of the self-diffusion coefficients in fluid-like ordered samples in the absence or presence of shear, as well as in polycrystalline samples during crystallization and coarsening. We discuss the scope and limits of our approach as well as possible future applications [1].

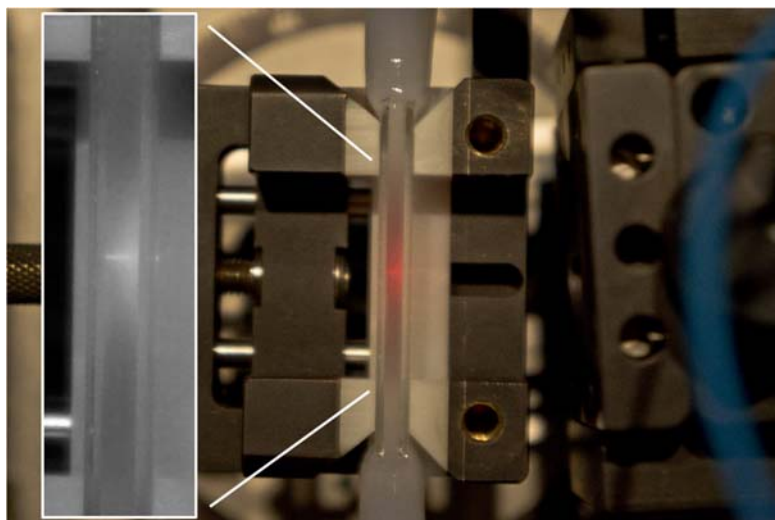


Figure 1. Optical appearance of a multiply scattering suspension in a rectangular cell with transmittance 40%, illuminated by a He-Ne laser from the left. Insert shows the intensity distribution in the multiple scattering cone.

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