Filament stretching and break-up behaviour of model colloidal dispersions as inkjet fluids

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Colloidal dispersions are widely used in inkjet ink formulations thanks to the very desirable advantages offered by solid pigments, e.g., long shelf life and high resolution upon deposition. In this study, a series of sub-100 nm monodisperse poly(methyl methacrylate) (PMMA) latex dispersions were prepared and used as model inkjet ink fluids with solvent mixtures of Ethylene glycol(EG) and water. Shear rheology measurements were initially conducted to characterize the bulk behaviour of the particle suspensions. Subsequently, elongation experiments of the fluids were carried out based on two Trimaster devices to investigate their filament stretching, thinning and break-up behaviour. Results indicate that within the reasonably narrow range explored here (i.e. [particle] ≤ 5 w/v %), the effect of particle concentration is subtle. However, as expected, when the EG content is increased in the continuous phase, filament thinning is less pronounced and the formation of satellite drops is more efficiently hindered (see Figure1). We show that this is due to the viscosity increase and surface tension reduction brought about by the increase in EG in the system, while the concentration of particles does not provide a significant change in behaviour.

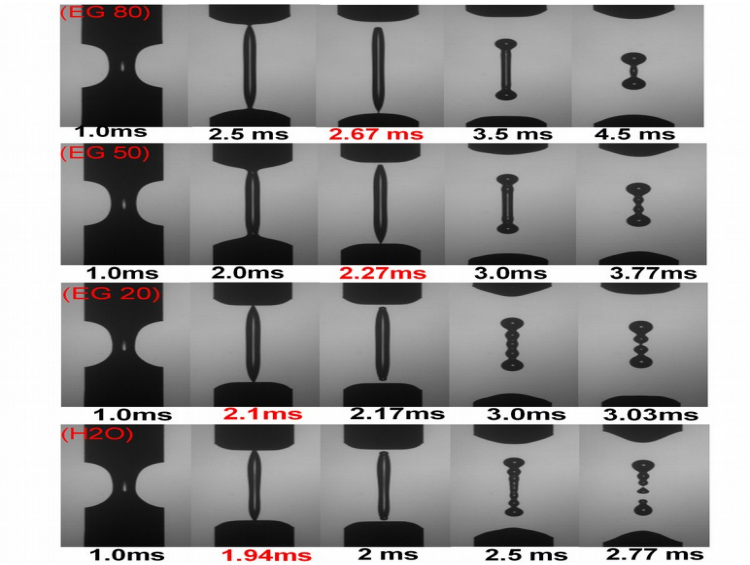

Figure1 Photographs of filament stretching captured with the Trimaster of PMMA dispersions in solvent mixtures with varied EG contents