Crystallization kinetics in attractive colloidal Hard Spheres obtained by small angle light and Bragg scattering

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Combined Bragg and small angle light scattering are used to investigate the crystallization kinetics of an attractive hard sphere system. The home built machine is an adaptation of the instrument introduced by Schätzel et al. [1]. We study the crystallization kinetics of swollen Polystyrene microgel particles of diameter 2a = 820nm [2] which to a good approximation show hard sphere behaviour in the density and refractive index matching solvent 2-Ethynaphtalene [3]. In addition to the pure samples we also prepared samples with added non-adsorbing, linear Polystyrene (M_w = 9600g/mol). With increasing amount of added polymer the crystallization process is successively delayed and the early stages of the crystallization process show modified Bragg reflection shapes. We observe obvious deviations from a pure fcc/hcp structure factor [4]. The difference in the crystallization scenario is also seen in the derived crystallization parameters. Possible interpretations are discussed.

![Graph a) Crystal structure factors S_c(q,t) = I(q,t)/P(q) – β(t)S(q,t=0) in the early growth stages from samples (a) without and (b) with 7g/l added polymer. The Miller indices of the Bragg-reflections are indicated. Note the change in the reflections’ shape and the delay in time.](image)

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