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Effect of polydispersity on the phase behavior of soft microgel suspensions ANDEA SCOTTI, URS GASSER, Laboratory for Neutron Scattering, Paul Scherrer Institut, EMILY HERMAN, AKITI SINGH, L. ANDREW LYON, School of Chemistry and Biochemistry, Georgia Institute of Technology, ALBERTO FERNANDEZ-NIEVES, School of Physics, Georgia Institute of Technology, LABORATORY FOR NEUTRON SCATTERING, PAUL SCHERRER INSTITUT TEAM, SOFT CONDENSED MATTER LABORATORY, GEORGIA INSTITUTE OF TECHNOLOGY TEAM, SCHOOL OF CHEMISTRY AND BIOCHEMISTRY, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — Microgel suspensions with a majority of small particles and a small fraction of big particles with about double diameter can form crystals without defects caused by the large particles (A. St. John Iyer and L.A. Lyon, Angew. Chem. Int. Ed. 48, 4562-4566, 2009). However, no hard sphere crystals form at size-polydispersities higher than 12%. We study the role of size-polydispersity in suspensions of fully swollen poly(N-isopropylacrylamide) (pNIPAM) microgel particles with controlled polydispersity ranging from 10% up to 25%. Crystals appear in samples with polydispersity as high as 17%. Using small-angle neutron scattering and contrast matching with samples composed of small deuterated particles and large protonated particles, we directly measure the form factor and shrinkage of the large particles in concentrated samples. The large particles are found to shrink to about the size of the small particles when the effective volume fraction of the suspension approaches 1. These results suggest a different role of size-polydispersity in soft sphere systems.

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