Abstract Submitted
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Amorphous and crystalline states of ultrasoft colloids: A Molecular Dynamics study A.N. RISSANOU, M. YIANNOURAKOU, I.G. ECONOMOU, NCRPS, Demokritos, D. VLASSOPOULOS, I.A. BITSANIS, FORTH-IESL — In dense suspensions of multi-arm star polymers a "*reversible thermal vitrification*" was observed experimentally under "marginal" solvent conditions. We have investigated the origin of this phenomenon via MD simulations at the *mesoscopic scale*[1,2,]. We reported the emergence of an amorphous solid state, upon heating of the "soft spheres". This transient glassy state resulted from star swelling, "free volume" deprivation and "dynamical arrest" of "soft-spheres". We monitored the ageing of the amorphous stage towards more crystalline FCC structures. The effects of size-dispersity and arm MW on crystallization were studied qualitatively. The overall picture revealed the existence of new "dynamically arrested" states, all of which could be termed "crystalline" but differed as to the "degree of crystallinity". Quantitative analysis of particle trajectories supplied mean square displacement curves which at the higher temperatures are typical of "delayed" Fickian diffusion. Even the aged crystalline states exhibited weak diffusion in contrast with the null diffusion of the crystals resulting from a FCC initial configuration. [1] Rissanou et al., *Phys. Rev. E* **71** 011402-1 :12 (2005) [2] Rissanou et al., *J. Chem. Phys.* **124** 044905-1 :11 (2006)

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