

Investigating of star - long chain mixtures phase diagram by means of a novel coarse-graining approach

E. Locatelli^{1*}, B.Capone¹, C.N.Likos¹

¹ *Faculty of Physics, University of Vienna, Vienna , Austria*

**emanuele.locatelli@univie.ac.at*

We present a novel coarse-graining approach, suitable for star-chain mixtures[1-3]. The approach is based on the calculation of the effective interaction between a star polymer and a short chain of length N_0 , which can be used to coarse-grain the interaction between a star and a longer chain or a more complex object. The effective interaction has been calculated numerically for star polymers of different functionalities f and for different degrees of polymerization N . We test our approach, calculating the effective interaction between a star polymer and a long chain of length N_c with both coarse graining and monomer resolved simulations and comparing the results: the comparison yields an excellent agreement between coarse-graining and monomer-resolved simulations. We employ this technique to study star - chain mixtures, focusing on the limit of very long homopolymers. We observe a strengthening of the glassy phase, in contrast with the melting induced by the presence of short chains[4].

- [1] E. Stiakakis, G. Petekidis, D. Vlassopoulos, et al., *Europhysics Letters*, **72:664**, (2005).
- [2] M. Camargo and C.N. Likos, *Physical Review Letters*, **104:078301**, (2010).
- [3] B. Lonetti, M. Camargo, J. Stellbrink, et al., *Physical Review Letter*, **106:228301**, (2011).
- [4] E. Stiakakis, D. Vlassopoulos, C.N. Likos, et al., *Physical Review Letters*, **89:208302**, (2002).