

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

How does a polymer swell in poor solvent mixtures? DEBASHISH MUKHERJI, Max Planck Institute for Polymer Research, CARLOS MARQUES, Institut Charles Sadron, CNRS, TORSTEN STUEHN, KURT KREMER, Max Planck Institute for Polymer Research — Macromolecular solubility in solvent mixtures often strike as a paradoxical phenomena. In a system where all particle interactions are repulsive, chains can nevertheless collapse, due to increased repulsive monomer-solvent interactions that lead to an effective attraction between monomer units also known as depletion induced attraction. While it is well understood why a polymer can collapse in a purely repulsive solvent, polymer swelling at intermediate mixing ratios of two repulsive solvents still lacks a microscopic explanation. Here, for binary solvent mixtures, we combine computer simulations and theoretical arguments to unveil the microscopic, generic origin of this collapse-swelling-collapse scenario. We show that this phenomenon naturally emerges at constant pressure in mixtures of purely repulsive components when a delicate balance of the entropically driven depletion interactions is achieved. [1] D. Mukherji, C. M. Marques, T. Stuehn, and K. Kremer, arXiv:1609.09839 (2016).

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Date submitted: 31 Oct 2016

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