Statistical physics of polymers

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Self-organizing polymer systems and soft matter are the special filed of statistical physics, where there is no analytical solution in most cases. Understanding or predicting the behavior of such systems is often possible only with computer modeling. Moreover, multiscale approaches and supercomputers are required, as the order in typical self-organizing systems is observed on the scales of thousands and even hundreds of thousands of atoms. In this lecture, I will tell you about the main features of the behavior of polymer systems in the case of microphase separation of block copolymers and the elasticity of crosslinked polymer elastomers. A brief description of the dissipative particle dynamics (DPD) technique will also be given, which has recently been increasingly used to model polymers and complex fluids at a coarse-grained level.