PC 53

SELF–SIMILAR WAVE OF SWELLING/COLLAPSE PHASE TRANSITION ALONG POLYELECTROLYTE GEL

A. Zubarev, A. Safronov, L. Iskakova

Ural State University, 620083 Ekaterinburg, Russia

Theoretical analysis of the possibility of collapse/swelling phase transition propagation along a polyelectrolyte gel thread has been performed. A differential equation that determines the time dependence of the degree of swelling of polymer thread under the radial mechanical force was obtained. It formally coincides with the equation of diffusion of an impurity in a medium with a certain source density that depends on excluded-volume and Coulomb interactions, osmotic pressure of counterions, and entropy of the subchains. Two stationary points of this equation correspond to contracted and swollen states. In was shown that once having been activated, the phase transition between these stationary points could propagate along the thread in the form of a wave with positive speed if the initial state is characterized by a higher level of free energy than the final state. The results of numerical calculations illustrating the process of phase transition propagation along polyelectrolyte gel thread show that propagation of the swelling/collapse phase transition takes place in the form of the stepwise self-similar wave with steep front. The sharp boundary between swollen and collapsed zones is observed and does not tend to dissipate as propagation proceeds.