

Polyelectrolyte gels: anisotropy and phase transitions

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We study electromechanical-chemical couplings of polyelectrolyte gels from the point of view of competitive dynamical systems. This allows us to characterize certain volume phase transitions in isotropic gels within a geometric perspective, and obtain precise conditions that guarantee existence of limit cycles, and oscillatory behavior of gel membrane devices. Part of the presentation will focus on mechanical properties of anisotropic gels to model semi-flexible polymers, in order to characterize density dependence, ordering phase transitions and network effects under applied stress. We will focus on continuum mean-field theory models of actin filament systems, and their coupled ordering (liquid crystal) and mechanical properties.