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Computational modeling of three-dimensional gel membrane in temperature gradient OLGA KUKSENOK, ANNA C. BALAZS, University of Pittsburgh — Gel membranes are used in a variety of applications, from controlled release of chemicals in drug delivery systems to flow regulation within microfluidic devices. The degree of swelling within the gel membrane regulates its permeability and hence, offers an opportunity to effectively control transport of different species through the layer. One of the efficient ways to control the degree of swelling of gels is by varying the temperature of the system. Here, we develop a computational model that allows us to simulate the three-dimensional dynamics of a gel membrane in a temperature gradient. We use this model to investigate the structural evolution of gel membranes that are clamped by two of its edges. We show that dynamics of forming patterns consisting of regions of more or less swollen gel strongly affects the membrane's properties. We demonstrate that by varying the temperature gradient, one can effectively control the permeability of the membrane.

Olga Kuksenok
University of Pittsburgh

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