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Controlling chemical oscillations in heterogeneous BZ gels via mechanical strain. VICTOR YASHIN, Chemical Engineering Department, University of Pittsburgh, KRYSTYN J. VAN VLIET, Department of Materials Science and Engineering, Massachusetts Institute of Technology, ANNA C. BALAZS, Chemical Engineering Department, University of Pittsburgh — We performed theoretical and computational studies to determine the effect of an applied mechanical strain on the dynamic behavior of heterogeneous polymer gels undergoing the oscillatory Belousov-Zhabotinsky (BZ) reaction. In these gels, the catalyst for the reaction is localized in specific patches within the polymer network and the BZ reaction only occurs within these BZ patches. We focused on a 1D model for the system, and considered two scenarios, in which the BZ reaction did or did not affect the degree of swelling within the gel. For gels having one and two BZ patches, we found that a longitudinal strain could induce transitions between the oscillatory and steady state regimes. For certain values of the BZ stoichiometric parameter f, these transitions could exhibit a hysteresis. In systems having two oscillating BZ patches, a strain could switch between the in-phase and out-of-phase synchronization of the oscillations. The ability to alter the dynamic behavior of BZ gels through mechanical deformations opens up the possibility of using these materials in novel chemo-mechanical sensors.

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