

Abstract Submitted  
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**Synchronization of oscillations in hybrid gel-piezoelectric active materials.** VICTOR V. YASHIN, Department of Chemical Engineering, University of Pittsburgh, STEVEN P. LEVITAN, Department of Electrical and Computer Engineering, University of Pittsburgh, ANNA C. BALAZS, Department of Chemical Engineering, University of Pittsburgh — We model the hybrid gel-piezoelectric active material that could perform oscillator based unconventional computing tasks (materials that compute). The material is assumed to have a cellular structure, where each cell contains a polymer gel, which undergoes cyclic swelling and deswelling due to the oscillatory Belousov-Zhabotinsky (BZ) reaction, and is coupled to a piezoelectric (PZ) film. Upon electrical connection, oscillations in the BZ-PZ units get synchronized, and the mode of synchronization is shown to depend on the number of units in the system, type of circuit connection, etc. Introduction of capacitors into the circuits allows us to further manipulate the synchronization modes, i.e., the distinctive patterns in phase of oscillations. The results indicate the BZ-PZ systems could be used for spatio-temporal pattern recognition.

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