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Chemotaxis of active, self-oscillating polymer gels in solution PRATYUSH DAYAL, AMITABH BHATTACHARYA, OLGA KUKSENOK, ANNA C. BALAZS, University of Pittsburgh — Fighting, fleeing and feeding are hallmarks of all living things; all these activities require some degree of mobility. Herein, we undertake the first computational study of self-oscillating polymer gels and show that this system can "communicate" to undergo a biomimetic, collective response to small-scale chemical changes. In this study we harness unique properties of polymer gels that undergo oscillatory Belousov-Zhabotinsky (BZ) reaction. The activator for the reaction is generated within these BZ cilia and diffuses between the neighboring gels. In order to simulate the dynamics of the BZ gels in surrounding fluid we have developed a nonlinear hybrid 3D model which captures the elasto-dynamics of polymer gel and diffusive exchange of BZ reagents between the gel and the fluid. We illustrate that multiple BZ gels in solution exhibit a distinct form of chemotaxis, moving towards the highest activator concentration in the solution. Similar ability to sense and move in response to chemical gradients constitutes a vital function in simple organisms, enabling them to find food and flee from poisons.

Pratyush Dayal
University of Pittsburgh

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