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Current Research:	Physics of Biomembranes Dynamics of Complex Fluids	

Non-Equilibrium Dynamics of Fluid Membranes

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I present simulation studies on the pattern formation of membranes (1) by the coupling of reaction-diffusion dynamics and (2) by the adhesion and flip-flop of curvature-inducing molecules.

(1) The mechanochemical feedback of curvature-inducing proteins stabilizes Turing patterns. Budding and multi-spindle shapes are also induced by Turing patterns. The speed of traveling waves is positively or negatively correlated with the local membrane curvature depending on the spontaneous curvature and bending rigidity. In addition, self-oscillation of the vesicle shape occurs, associated with the reaction-diffusion waves.

(2) In equilibrium conditions, the membrane domains form checkerboard patterns in addition to stripe and spot patterns. In nonequilibrium, characteristic patterns are obtained.