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Folding dynamics of a polymer-like granular chain in a thin layer of water JEFFREY OLAFSEN, Department of Physics, Baylor University, BEN BAMMES, Baylor College of Medicine — A stainless steel chain of loosely connected monomers shaken in a thin layer of water on a vertically oscillated, horizontal plate demonstrates dynamics that are visually similar to that of polymer collapse in a poor solvent. The Faraday waves on the surface of the shaken fluid layer act as a thermal bath of excitations, and the surface tension of the fluid plays the role of a long-ranged potential that is minimized in the folding process. While the system is only two-dimensional, there is a one-to-one correspondence in the dynamics of this system and that of polymer folding. The granular chain demonstrates both "on-pathway" and "off-pathway" intermediate states during the folding process, as well as crossovers to different characteristic folding times that correspond to the dominance of different terms in the folding potential. The ability to tune the excitations via the Faraday waves on the fluid surface may afford control of the thermal bath in a manner that is inaccessible in real polymer experiments. Altering the wetting properties of the monomers allows for the creation of both hydrophobic and hydrophilic portions of the same chain resulting in a model lipid.

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