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Lower limit of shear to induce 2-D protein crystals[1] JAMES YOUNG, DAVID POSADA, AMIR HIRSA, Rensselaer Polytechnic Institute, JUAN LOPEZ, Arizona State University — Proteins are an essential part of every organism. Protein functionality depends on its structure. In order to utilize the most widely used and powerful technique of X-ray crystallography, the protein must first be crystallized. Crystallization is not a trivial step and success rate is often dismal. One approach is two-dimensional protein crystallization at the air/water interface which entails the binding of protein initially in solution to a ligand that has been spread on the interface to form a monolayer. 2-D crystallization avoids some of the complications of 3-D crystallization such as gravity. It also reduces the amount of protein needed by 3 orders of magnitude. Here we quantify the level of interfacial shearing needed to enable crystals to be formed at protein surface concentrations lower than those required in a quiescent system. A phase diagram is presented delineating the required shear rate for a given surface pressure. In addition, surface shear viscosity is demonstrated to be a sensitive macroscopic probe for the in-situ detection of flow-induced crystals.

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