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Protein crystallization on liquid surfaces: Forced versus natural crystallization A. HIRSA, A. NEJATBAKHSH, G. BELFORT, H. LIU, Rensselaer Polytechnic Institute — Two-dimensional crystallization of proteins has recently been reported where streptavidin protein dissolved in the bulk liquid anchors to binding sites on a biotinylated lipid monolayer initially spread on the liquid surface. Thermodynamic aspects investigated include the effects of subphase buffer and pH, dilution of bulk protein and monolayer. Here, we investigate three possible avenues where flow can influence protein crystallization: i) change the initial state of monolayer, ii) advect dissolved protein to the interface, iii) apply direct hydrodynamic force on the crystals at the interface. The flow system consists of a stationary open cylinder driven by constant rotation of the floor, in the axisymmetric flow regime with inertia. Direct imaging of the interface illuminated by forward scattering of a laser was utilized to avoid labeling proteins for conventional fluorescence microscopy. These images provide greater detail than Brewster angle microscopy. Scientific motivation is to use flow to probe protein structure, and the application is to make designer protein thin-films, e.g. for biosensors.

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