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Effects of flow on insulin fibril formation at an air/water interface DAVID POSADA, CARYN HELDT, MIRCO SORCI, GEORGES BELFORT, AMIR HIRSA, Rensselaer Polytechnic Institute — The amyloid fibril formation process, which is implicated in several diseases such as Alzheimer's and Huntington's, is characterized by the conversion of monomers to oligomers and then to fibrils. Besides well-studied factors such as pH, temperature and concentration, the kinetics of this process are significantly influenced by the presence of solid or fluid interfaces and by flow. By studying the nucleation and growth of a model system (insulin fibrils) in a well-defined flow field with an air/water interface, we can identify the flow conditions that impact protein aggregation kinetics both in the bulk solution and at the air/water interface. The present flow system (deep-channel surface viscometer) consists of an annular region bounded by stationary inner and outer cylinders, an air/water interface, and a floor driven at constant rotation. We show the effects of Reynolds number on the kinetics of the fibrillation process both in the bulk solution and at the air/water interface, as well as on the structure of the resultant amyloid aggregates.

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