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Fundamental Investigations of the Extracellular Proteins Fibrin and Collagen in Microchannel Devices[1] HEATHER M. EVANS, SARAH KOESTER, THOMAS PFOHL, Max Planck Institute for Dynamics and Selforganization, Goettingen, Germany — Microfluidic structures are particularly amenable to controlled investigations of protein bundle and network formation. Hydrodynamic focusing is utilized to create a diffusion-controlled gradient of reactants, enabling non-equilibrium investigations. We present studies of the blood clotting protein fibrin, a three-dimensional network formed from the enzymatic cleavage of fibrinogen monomers by the protein thrombin. Fibrin is a vital component of blood clots, and has been implicated in a variety of diseases. Real-time fluorescence microscopy and x-ray micro-diffraction are used to quantify supramolecular assembly and provide snapshots of the evolution of fibrin network formation. We also show that collagen, a ubiquitous extracellular protein, can be bundled in situ through the use of a pH gradient. An outlook toward artificial blood vessels arises from the insight that both fibrin and collagen can easily be used to coat microchannel structures. The resulting mesh forms an ideal environment for red blood cells and other cell types.

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