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Engineering and Characterization of Collagen Networks Using Wet Atomic Force Microscopy and Environmental Scanning Electron Microscopy JENNA OSBORN, TONYA COFFEY, BRAD CONRAD, JENNIFER BURRIS, BROOKE HESTER, Appalachian State University — Collagen is an abundant protein and its monomers covalently crosslink to form fibrils which form fibers which contribute to forming macrostructures like tendon or bone. While the contribution is well understood at the macroscopic level, it is not well known at the fibril level. We wish to study the mechanical properties of collagen for networks of collagen fibers that vary in size and density. We present here a method to synthesize collagen networks from monomers and that allows us to vary the density of the networks. By using biotynilated collagen and a surface that is functionalized with avidin, we generate two-dimensional collagen networks across the surface of a silicon wafer. During network synthesis, the incubation time is varied from 30 minutes to 3 hours or temperature is varied from 25°C to 45°C. The two-dimensional collagen network created in the process is characterized using environmental atomic force microscopy (AFM) and scanning electron microscopy (SEM). The network density is measured by the number of strands in one frame using SPIP software. We expect that at body temperature (37°C) and with longer incubation times, the network density should increase.

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