

Abstract Submitted
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Monitoring single protease activities on triple-helical collagen molecules¹ RAJ HARZAR, JAMES FROBERG, Dept. Physics, North Dakota State University, D. K. SRIVASTAVA, Dept. Biochemistry, North Dakota State University, YONGKI CHOI, Dept. Physics, North Dakota State University — Matrix metalloproteinases (MMPs), a particular family of proteases, play a pivotal role in degrading the extracellular matrix (ECM). It has been known for more than 40 years that MMPs are closely involved in multiple human cancers during cell growth, invasion, and metastasis. However, the mechanisms of MMP activity are far from being understood. Here, we monitored enzymatic processing of MMPs with two complementary approaches, atomic force microscopy and nanocircuits measurements. AFM measurements demonstrated that incubation of collagen monomers with MMPs resulted in a single position cleavage, producing 3/4 and collagen fragments. From electronic monitoring of single MMP nanocircuit measurements, we were able to capture a single cleavage event with a rate of 0.012 Hz, which were in good agreement with fluorescence assay measurements.

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