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Investigating the correlation between molecular structure and mechanical properties of collagen using optical tweezers

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Collagens represent a prominent family of fibrous structural proteins present in the majority of connective tissues in mammals that contribute to their mechanical behaviors. Collagen self-assembles into well-defined structures including fibrils, which makes it an excellent example of a hierarchical biological system with a broad range of functions. It is known that fibril formation kinetics can be slowed down considerably by removal of short regions at both ends of collagen molecules called telopeptides. It has been suggested that telopeptides act by forming specific, transient interactions with other collagens, which could facilitate faster fibril formation. In this study, to identify and characterize interactions between collagen molecules, local viscoelastic properties of collagen systems are probed using optical tweezers.

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