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Single Molecule Measurements Using Correlation Force Spectroscopy[1] MILAD RADIOM, Chemical Engineering, Virginia Tech, BRIAN ROBBINS, Mechanical Engineering, Virginia Tech, JOHN WALZ, Chemical Engineering, Virginia Tech, MARK PAUL, Mechanical Engineering, Virginia Tech, WILLIAM DUCKER, Chemical Engineering, Virginia Tech — Thermal noise represents a fundamental limit in force measurements. We describe single molecule measurements using two AFM cantilevers that have lower thermal noise than single-cantilever measurements. We achieve this by measuring the correlated thermal motions of two closely spaced cantilevers. Because only correlated thermal noise is measured, there is lower noise. In addition, the use of two cantilevers produces both decreased hydrodynamic fluid damping and decreased van der Waals forces acting on an AFM probe, both of which are interferences in single molecule measurements. Analysis of the correlated motions reveals molecular damping, a parameter that is not sensed with conventional (pulling) AFM single molecule force spectroscopy. When a molecule is straddled between the two cantilevers, the correlation arises from the solvent coupling as well as stiffness and damping of the molecule. We will describe the technique of correlation force spectroscopy and measurements of the mechanical properties of single polymer chains such as dextran.

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