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Mechanical Sensing with Flexible Metallic Nanowires VLADIMIR DOBROKHOTOV, MEHDI YAZDANPANAH, SANTOSH PABBA, ABDELILAH SAFIR, ROBERT COHN, ElectroOptics Research Institute and Nanotechnology Center University of Louisville — A calibrated method of force sensing is demonstrated in which the buckled shape of a long flexible metallic nanowire is interpreted to determine the applied force. Using a nanomanipulator the nanowire is buckled in the chamber of a scanning electron microscope (SEM) and the buckled shapes are recorded in SEM images. Force is determined as a function of deflection for an assumed elastic modulus by fitting the shapes using the generalized elastica model. In this calibration the elastic modulus was determined using an auxiliary AFM measurement, with the needle in the same orientation as in the SEM. Following this calibration the needle was used as a sensor in a different orientation than the AFM coordinates to deflect a suspended PLLA polymer fiber from which the elastic modulus (2.96 GPa) was determined. In this study the same needle remained rigidly secured to the AFM cantilever throughout the entire SEM/AFM calibration procedure and the characterization of the nanofiber.

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