

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

AFM cantilever vibration detection with a transmitted electron beam TAYLOR WOEHL, RYAN WAGNER, ROBERT KELLER, JASON KILLGORE, Material Measurement Laboratory, National Institute of Standards and Technology — Cantilever oscillations for dynamic atomic force microscopy (AFM) are conventionally measured with an optical lever system. The speed of AFM cantilevers can be increased by decreasing the size of the cantilever; however, the fastest AFM cantilevers are currently nearing the smallest size that can be detected with the current optical lever approach. Here we demonstrate an electron detection scheme in an SEM for detecting AFM cantilever oscillations. An oscillating AFM tip is positioned perpendicular to the propagation direction of a stationary ≈ 1 nm diameter electron probe, and the oscillatory change in electron scattering resulting from the changing thickness of the electron irradiated area of the AFM tip is detected with a transmitted electron detector positioned below the AFM tip. We perform frequency sweep and ring-down experiments to determine the first resonant frequency and Q factor of an AFM cantilever.

Taylor Woehl
Material Measurement Laboratory, National Institute of Standards and Technology

Date submitted: 04 Nov 2015

Electronic form version 1.4