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Quantitative imaging of lateral stiffness using sub-Ångstrom oscillation amplitude nc-AFM MEHRDAD ATABAK, SEVIL OZER, Bilkent University, Turkey, H. OZGUR OZER, Trinity College, Dublin 2, Ireland, AHMET ORAL, Bilkent University, Turkey, SPM GROUP, BILKENT UNIVERSITY TEAM — The specially designed and constructed a nc-AFM, capable of measuring lateral stiffness simultaneously with tunneling current will be discussed. In our technique a sensitive fiber interferometer is aligned at the side of a home–made tungsten cantilever with typical stiffness of about 150 N/m. To improve the sensitivity, a RF circuit is designed to inject RF current into the laser diode. The frequency and the amplitude of the RF current can be adjusted to optimize the noise reduction. Using this technique a noise level of $\sim 1\times 10^{-4}$Å$/\sqrt{Hz}$ is obtained. The cantilever is dithered in lateral direction respect to the sample with sub-Ångstrom oscillation amplitudes (A_0 =0.25 Å) at a frequency, well below the resonance frequency and the changes in lateral oscillation amplitudes. The amplitude at the tip, which is altered by the tip-surface, is detected from the interferometer output using a lock-in amplifier. We present the performance of our microscope and lateral stiffness images as a function of tunnel current (relative tip-sample distance) on HOPG surface.

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