

Dual Frequency AFM

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Scanning probe microscopy (SPM) uses a number of different scanning modes to characterize surface topography and other characteristics. We will present a new SPM imaging mode that goes beyond traditional phase image in measuring mechanical and chemical properties. In this new imaging mode, Dual AC™, a cantilever is driven at or near two of its flexural eigenmodes. For most cantilevers, these eigenmodes are non-harmonic. The 2nd eigenmode amplitude and phase show strikingly different contrast from the same fundamental eigenmode signals. As in traditional AC imaging, the cantilever and imaging parameters can be chosen such that the tip-sample interactions are either attractive or repulsive. In general, if the cantilever is maintained in the attractive state, the 2nd eigenmode is sensitive to long ranged forces and if the cantilevers is maintained in the repulsive state, the 2nd eigenmode is sensitive to mechanical properties of the sample. Data on Magnetic and Electric Force Microscopy (MFM and EFM) samples, collagen fibers, and λ -digest DNA be shown to support this.