Imaging elastic property of surfaces at nanoscale using atomic force microscopy at ultrasonic frequencies

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Abstract:

We shall present a new technique to characterize and image the distribution of local elastic property using atomic force microscope (AFM) at ultrasonic frequencies. We describe the methodology of this measurement technique in detail and interpret the images obtained at these ultrasonic frequencies using simple arguments. We have used few selected samples to elucidate the capability of this technique to image the distribution of the local elastic property of the sample surface. We could semi-quatitatively determine the overall changes in the local stiffness on the sample surface by measuring the changes in the amplitude of the tip-surface contact resonance and compare it with the force-distance measurement at various regions on the sample surface. This technique will be very important to map local elasticity over the whole surface area.