Investigating the Interactions Between a Scanning Tunneling Microscope Tip and an Au- Coated Microcantilever

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ABSTRACT: In this work we investigated the interactions between an STM tip and a Au-coated cantilever in ambient conditions. A system was constructed to position an STM tip on the top of a Au-coated cantilever. We showed that performing Scanning Tunnelling Microscopy (STM) on a Au-coated microcantilever was not possible beyond 115 μm from the chip of the probe. The instability condition of the cantilever due to the interactions between the STM tip and the cantilever resulted in poor resolution of the obtained images. The Van der Waals, electrostatic, capillary and repulsive forces were investigated, and found to affect the tip-cantilever interactions. As the piezo adjusted the STM tip up and down to maintain the tunnelling current set point, the magnitude of the forces changed which led the deflection of the cantilever to vary. It was noted that different factors affected the strength of the forces such as the relative humidity, the tip location on the cantilever and the radius of the tip.

This is a MSc final presentation and graduate students from our department are especially encouraged to attend.