

Conservative and dissipative lateral forces during the manipulation of organic molecules

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The measurement of lateral forces between the tip of a force microscope and atomic scale features on the surface of a sample is an important issue in manipulation experiments. Feedback- controlled excitation of the torsional eigenmode of a rectangular cantilever beam forces the tip to oscillate parallel to the surface. We already reported the general capability to measure lateral forces using this technique [1] at a step edge and we now observe these forces during the manipulation of organic molecules.

We have studied the lateral forces while manipulating single Cu-TBPP molecules on Cu[100] [2]. Conservative and dissipative lateral interactions will be discussed while the tip is close or even directly above one porphyrine molecule. These results will be compared with those measured over a step edge or an impurity on the surface.

[1] O. Pfeiffer et al., Phys. Rev. B 65, 161403 (2002)

[2] Ch. Loppacher et al., Phys. Rev. 90, 066107 (2003)