Image correction for AFM images with functionalized tips

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Recently, noncontact atomic force microscopy (AFM) has been used to reveal the chemical structure of various molecules [1], [2].
In these studies submolecular resolution was only obtained with functionalized tips.
In particular, CO-functionalized tips enabled imaging with unprecedented resolution.
Unfortunately, the molecular geometry seemed to be streched and distorted.
This effect is attributed to the bending of the CO-molecule in the force field of the sample [3].

Here, we present a technique to correct for the image distortions due to this effect.
To quantify the lateral forces, we measured 3D-maps of the df-signal above the molecule under study. From this data we calculated the lateral forces and assumed the CO bending to scale linear with the lateral force component.
In this simple model one needs just one parameter, being the effective lateral stiffness of the probe position, to correct for the distortions in the images of pentacene on Cu and on NaCl. As the distortion of the original images in both cases is quite different, a successful correction with the lateral stiffness suggests the general applicability of the technique.

References

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