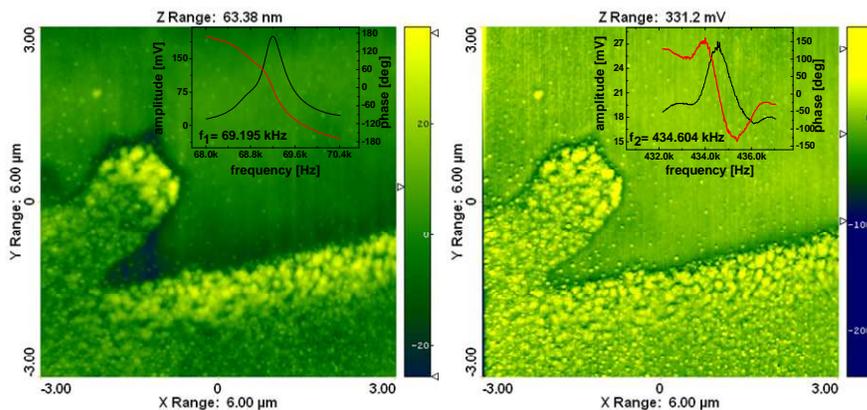


SINGLE PASS KELVIN PROBE MEASUREMENT TECHNIQUE IN AIR WITH DUAL-OC4

The Kelvin probe technique is increasingly gaining importance in AFM measurements since it gives access not only to the topography but also to chemical information of the tip and sample. It is an extremely sensitive analytical method to detect changes in contact potential difference between different materials or chemical elements on the surface.

We use the Nanonis SPM Control System to operate a Veeco MultiMode microscope in air to investigate variations of the surface potential in a single pass technique. The tip-sample distance is controlled in intermittent contact at the first resonance, whereas the Kelvin information is obtained by electrostatically exciting the oscillation of the cantilever at its second resonance. Two Nanonis oscillation controllers OC4 are used as lock-in detectors for the two resonance modes. The integrated Kelvin module minimizes the amplitude of the second resonance by constantly adjusting the applied DC bias voltage. This voltage is a direct measure for the contact potential difference (CPD) between the tip and the surface.

The single pass Kelvin technique has several advantages: fast way of imaging, precise measurements by keeping the contact between the tip and sample, and the Nanonis easily configurable setup lets us profit from them all.



Clear contrast in the topography (left) and CPD measurements (right) on a platinum/tungsten sample in air. The step between the two materials is well resolved in the two images.

Reference:

Measurements performed during the AFM-School, Lille 11-14 March 2008.
<http://heinerd.online.fr/formation/>

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Two oscillation controllers (Dual-OC4) digitally integrated with the Nanonis real-time controller. The two OC4 devices can be used either as two PLLs or two lock-in detectors, or one PLL and one lock-in.

Nanonis Modules in Use:

- Base Package
- OC4-Dual Add-on
- Kelvin Controller – software module
- Veeco Adaptation Kit

System:

- Veeco MultiMode Microscope



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