APPLICATION NOTE

NCMN Central Facility for Scanning Probe and Materials Characterization (SPMC)

NCMN
Nebraska Center for Materials and Nanoscience
University of Nebraska

Electrical Property Mapping at the Nanoscale with PeakForce Tunneling Atomic Force Microscopy (PF-TUNA)

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PeakForce TUNA operated in PF-Tapping mode with PF-TUNA Nanoelectrical Application Module provides access to the full fA to µA current range without changing module or probe holder. PeakForce TUNA enables quantitative conductivity mapping on a wide range of samples while eliminating the adverse effects caused by sample damage and tip contamination. Other benefits include dramatically improved ease of use with ScanAsyst™ Imaging Mode.

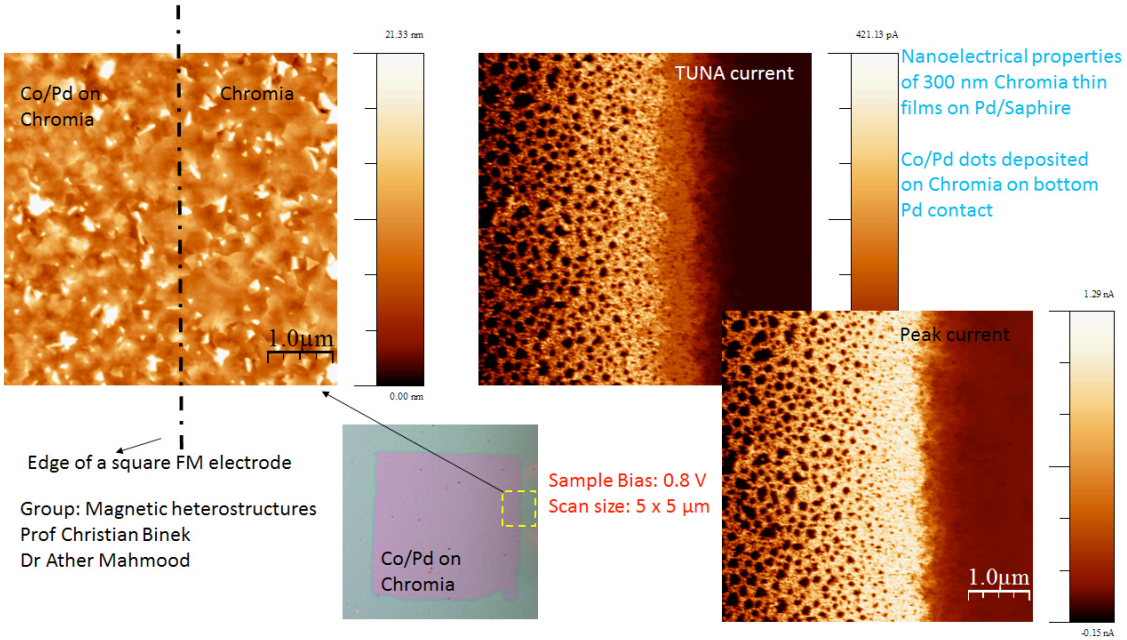

Figure 1 High-resolution conductivity map of Co/Pt dots on Chromia. The image size is 5µm x 5µm, PF-TUNA images taken at 0.8 V DC bias, using Bruker's SCM-PIT probe (20nm PtIr coating). Image courtesy of Dr. Mahmood, Prof. Binek.

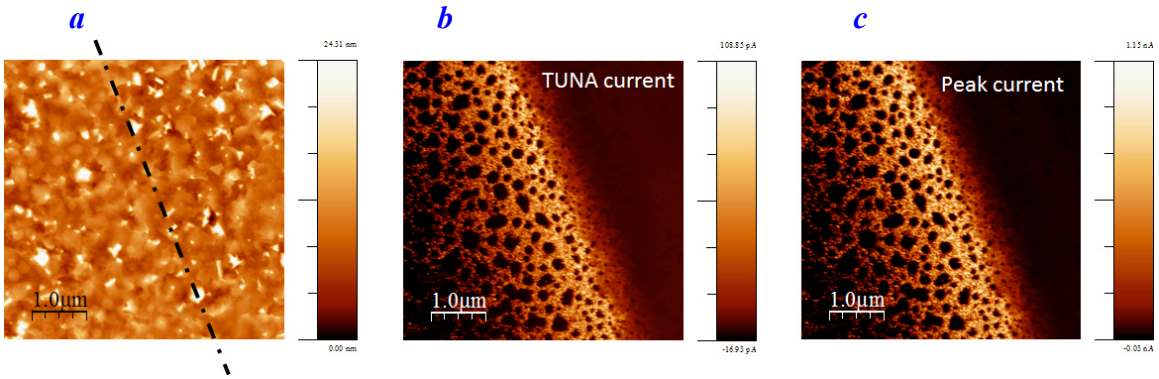

Figure 2

(a) AFM Topography image
(b) **TUNA Current** is the average current over one full tapping cycle. It includes both the current measured while tip is in contact with the surface and while it is off the surface.
(c) **Peak Current** is the instantaneous current, coinciding with Peak Force.

PF-TUNA Remarks

- Enables reliable nano-electrical imaging on soft delicate samples such as loosely bound nanostructures, conductive polymers
- Highest resolution current mapping on the most fragile samples such as organic photovoltaics, lithium ion cathodes, and carbon nanotube assemblies
- Simultaneous nanoelectrical and nanomechanical properties mapping
- In addition to the imaging mode, PF-TUNA cam also measure local current-voltage (I-V) spectra using the spectroscopy mode.