Switching Graphitic Polytypes in Elastically Coupled Cavities

Conductive AFM Characterization with Park NX-Hivac

The Challenge

"Resolving graphitic polytype switching at the nanoscale required a reliable local electrical readout together with controlled mechanical loading."

TEL AVIV UNIVERSITY אוניברסיטת תל אביב

— Prof. Moshe Ben Shalom
School of Physics and Astronomy

Your Challenge, **Our Solution**

Park NX-Hivac



This case study is based on Tel Aviv University research on force-driven switching of graphitic polytypes in elastically coupled cavities, published in Nature Nanotechnology.

Park SYSTEMS

Park NX-Hivac

Customer Success Story

TEL AVIV UNIVERSITY אוניברסיטת תל אביב



The Solution

Controlled-Environment Conductive AFM
Maps local current contrast under a nitrogen atmosphere

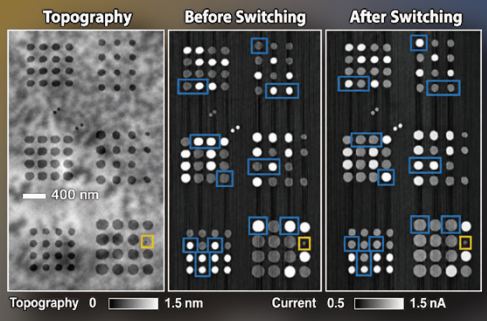
Friction Force Imaging
Quantifies lateral force during controlled switching scans

Nanoscale Current Mapping
Distinguishes Bernal and rhombohedral islands within cavity arrays

Contact-Mode Surface Preparation
Removes residual contamination before current mapping

Conductive AFM Reveals and Switches Graphitic Polytypes

Conductive AFM current maps acquired under low load reveal stacking changes induced by high-load scans. Bright and dark islands indicate rhombohedral (R) and Bernal (B) stacking, respectively.



Related Publication
Nature Nanotechnology. DOI: 10.1038/s41565-025-02121-w

The Results

30 nm Cavity Switching
Demonstrated reversible switching in cavities down to 30 nm

Sub-nN Lateral Shear
Reduced the switching force below 1 nN in channel-connected cavities

Sub-fJ Switching Energy
Achieved less than 1 fJ per switching event

Elastic Coupling
Controlled switching thresholds and trajectories between neighboring islands

"Conductive AFM with Park NX-Hivac enabled us to identify local current contrast between Bernal and rhombohedral islands and follow their switching under controlled loading."

— Prof. Moshe Ben Shalom

