

# Solar Cells Optical Property - Photoconductivity



**Sample:**  
Solar Cell

**Image Conditions:**  
Contact Mode AFM  
Tr-IAFM  
Force (?? nN)  
Scan Speed (?? Hz)

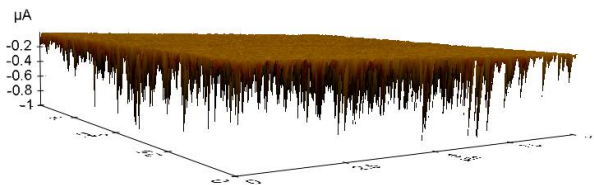
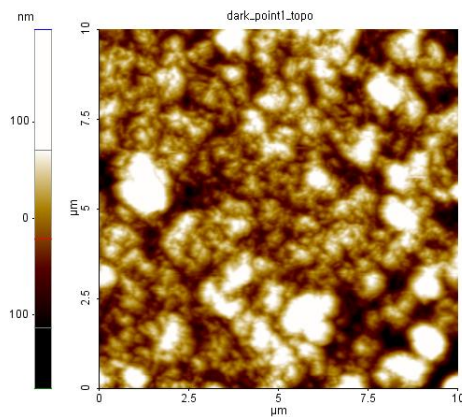
**System Requirement:**  
Closed-loop AFM  
System, Conductive  
AFM

## The Benefits

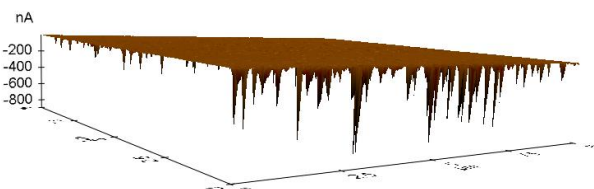
XE-AFM series offers many modes that are well suited for photonic devices and materials. In particular, Time Resolved Conductive AFM (Tr-IAFM) offers the ability to obtain the conductivity data with the AFM laser turned off (at alternative scan lines) so time resolved photo-induced current can be measured:

- with topography
- with nanoscale spatial resolution, and
- without interference from the AFM laser source.

Park Systems Inc  
3040 Olcott St  
Santa Clara, CA 95054  
Tel: 408.986.1110  
Fax: 408.986.1199  
[www.parkAFM.com](http://www.parkAFM.com)  
[info@parkAFM.com](mailto:info@parkAFM.com)



**Topography** (left image) and **photocurrent** (right images) with **laser source on** (top right image) and **laser source off** (bottom right image) show the effect of light in current generation; note the increased amount of photo-induced current in the upper image.



## XE-Productivity in Action

Jeongjin Lee, Inhee Choi, Surin Hong, SuSeung Lee, Young In Yang, Younghun Kim, Jongheop Yi; **Construction of pcAFM module to measure photoconductance with a nanoscale spatial resolution**; Ultramicroscopy 108 (2008) 1090– 1093  
**Equipment:** Park Systems XE-150

### Abstract

A photoconductive atomic force microscopy (pcAFM) module was designed and the performance was tested. This module consisted of three units: the conductive mirror-plate, the steering mirror and the laser source. The module with a laser irradiation unit was equipped to a conventional conducting probe atomic force microscopy (CP-AFM) instrument to measure photoconductance in a nanoscale resolution. As a proof-of-concept experiment, the photoconductance of aggregated fullerene on indium tin oxide (ITO) substrate was measured with this module. The electrical signals (currents) of aggregated fullerene under the conditions of laser on/off at about -10V sample bias voltage were -100 to -160 nA and 0 to -20 nA, respectively. Results indicated that the pcAFM with this module allowed one to observe photoinduced changes of electrical properties in nanodevices with nanoscale spatial resolution.

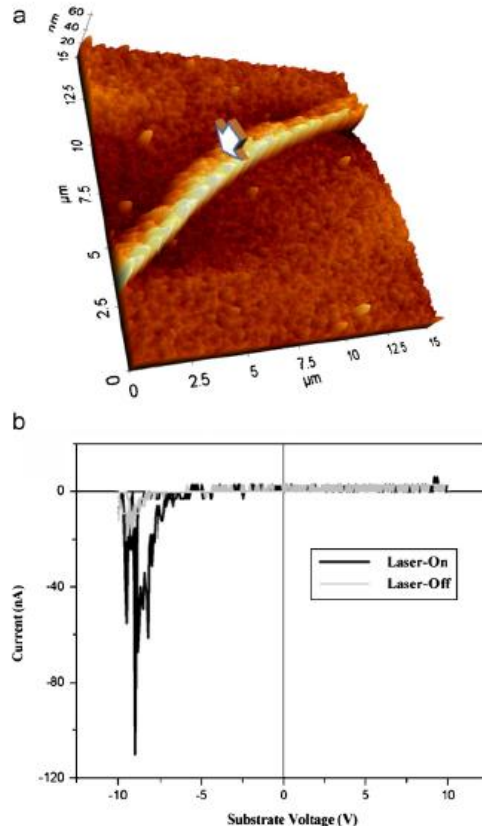


Fig. 3. (a) 3-D topography of the contact point for the I/V curve measurement and (b) the measured I/V curve. The resistance was decreased by a factor of 5–100. The arrow in (a) indicates the point at the slope of the sub-circle line, ca. 10 nm height from the bottom. At this point, the electrical signals (currents) of aggregated fullerene under the conditions of laser on/off at about -10 V sample bias voltage were -100 to -160 nA and 0 to -20 nA, respectively.