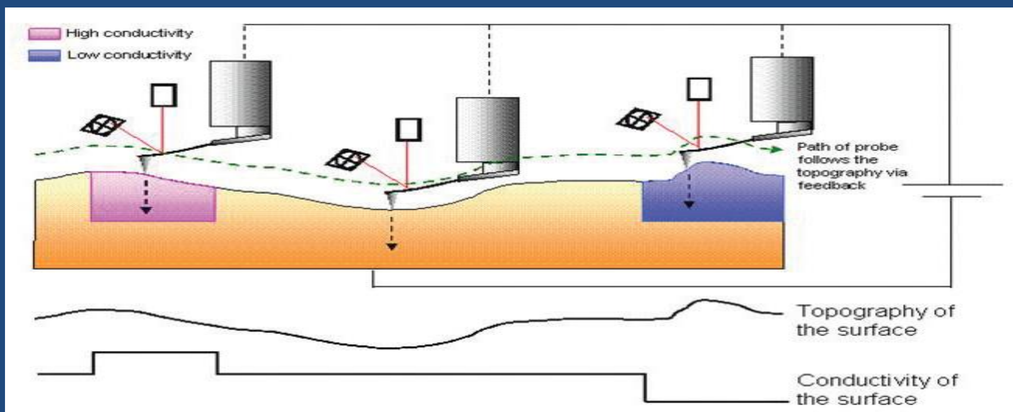
CONDUCTIVE ATOMIC FORCE MICROSCOPY (CAFM)

Full-plus ARA-AFM provides CAFM which characterizes conductivity variations across medium.
CAFM is the same as STM with extra advantages . In STM only the current variation is reordered and in CAFM apart from recording the tunneling current simultaneously topographic image is given by tip-sample interaction force measurement. Valuable information is obtain by comparing current variation image and topographic image at the same point on the sample.



C-AFM operating features

Spectroscopic mode: the tip is stationary, while the voltage is being swept. This allows recording conventional current-voltage characteristics from tiny areas of the sample, and thereby to extract information on the local electronic properties, such as local density of states.

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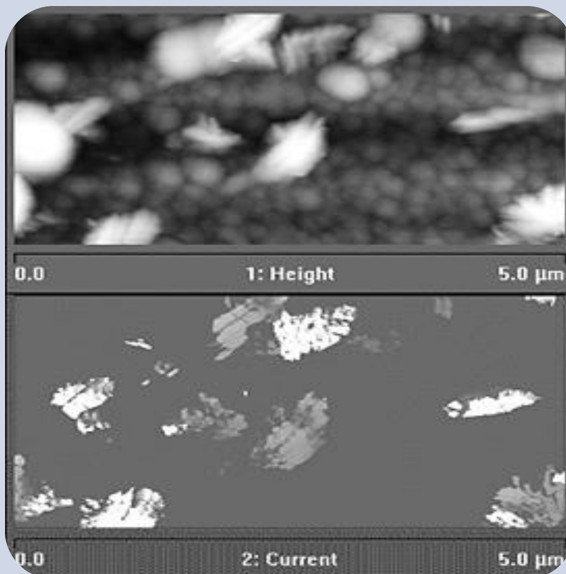

AFM (top) and C-AFM (bottom) images of Si/SnO_2/glass. The Si film is composed by an amorphous matrix with some crystalline phase. Because of its higher electric conductivity, the crystalline phase is readily distinguished from the amorphous phase in the C-AFM image.

- Several kinds of conductive tips can be used in CAFM, but the most successful are the conductive diamond-coated silicon tips. Besides having a good conductivity, the diamond layer is resistant to wear.
- An electric circuit, with current amplifiers and filters, monitors the current, which can vary from a few pA up to 500 nA. accuracy up to a few pA
- high spatial resolution
- suitable to identify conducting paths in solar cells and to locate micro shunts

Applications:

- map variations of electrical conductivity for a range of studies and processes, including electrical defect characterization and investigation of conductive polymers, semiconductors, nanotubes, and even certain organic materials.
- generating local current versus voltage (I-V) curves.
- identify differences in the conductivity between grain boundaries of polycrystalline thin films.