Characterization of Local Material Properties by Nano-probes

**TAKAHASHI LAB.**

**[Nano-probing Technologies]**

Centre for Interdisciplinary Research on Micro-Nano Methods

Nano-electronics

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Development of novel nano-probing technologies and nano-scale characterization of nano-materials for future device application

We aim at investigating electronic and optical properties in various nano-materials by means of nano-probe methods such as scanning tunneling microscopy (STM), atomic force microscopy (AFM), and related ones.

♦ **Characterization of Solar Cell Materials**

  - Photovoltaic properties and minority carrier dynamics
  - Photothermal spectroscopy by AFM

  ![Images of topography and photothermal signals on CIGS solar cell](image1)

♦ **Characterization of Carbon Nanotube FETs**

  - Current detection by magnetic force microscopy (MFM)

  ![Channel properties in CNT-FET examined by current-induced magnetic force measurements by MFM](image2)

♦ **Development of Novel SPM Methods**

  - Fast imaging in AFM
  - Novel operation methods for high performance SPMs

  ![Topographic images of InAs quantum dots observed by fast mode AFM](image3)

♦ **Physics in Quantum Nanostructure**

  - Observation of physical phenomena in low-dimensional semiconductors

  ![Photo-induced current signals on InAs wire structures observed by STM under light illumination](image4)

Multi-functional SPM equipments:

(a) air type, (b)/(c) high vacuum and variable temperature type

Tunable Ti:Al₂O₃ laser with solid state green laser

Variable temperature SPM in ultra-high vacuum