

Scanning Probe Microscopy (Nano Measuring, Nano Simulation)

Technical description

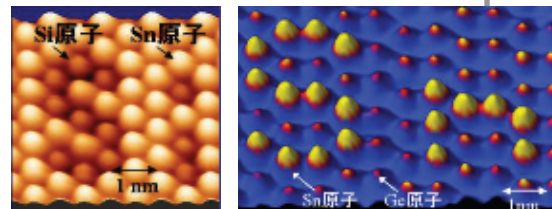
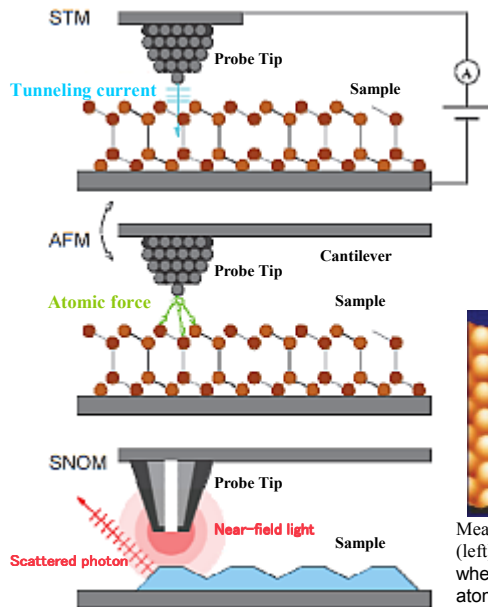
Scanning Probe Microscopy (SPM) is the generic name of a device measuring three-dimensional shape, mechanical and electrical properties, while a thin needle as a probe traces the sample surface, that is classified in following three kinds.

- Scanning Tunneling Microscopy (STM)

Energizing voltage between a probe and sample in vacuum, and a probe approach the sample, and the height of the atom of the sample surface precisely, by measuring a tunneling current drifting between a probe and the sample.

- Atomic Force Microscopy (AFM)

With a probe approaching the sample, while measuring very small deflection of the cantilever by the atomic force between atoms of end of a probe and the sample, a height of the atom of the sample surface is measured precisely.



Measuring example of AFM (Provided by Prof. Morita, Osaka university)
(left) The Si atoms of the probe are replaced with a surface Sn atom when a probe made by Si contact with the Sn surface and we can insert Si atoms in the surface. We can apply this technique to the exact placement of the atom with the semiconductor.

(right) We pick up one Sn atom with an AFM probe and move horizontally and carry it and install it in the designated position of the Ge surface and can picture a letter with a Sn atom. We can apply this technique to an atom assembling device.

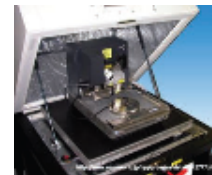
Example of the practical use

【Examples of Measurement with Scanning Probe Microscopy, and Applications】

- An Atom and Electronic States of Semiconductor Surface
→ Elucidation of Properties of Matter, Development of New Nano Device
- Surface Shape of Nano-tech Materials
→ New Nano-materials Development
- Shape of Protein Molecules, DNA Molecules
→ Elucidation of the Biomolecular Function, New Medicine Development

Research and development problem

- (1) Improvement of the resolution
- (2) Realization of the measurement environment
- (3) Application to the nanostructure assembling
- (4) Enhancement of the analysis technology



SPM