Probing the Nanoscale with Advanced AFM/SPM

Sang-il Park

Park Systems Corp, KANC 4F, Iui-Dong 906-10, Suwon, Korea 443-270

Atomic Force Microscope (AFM) is a superb tool for probing the nanoscale. However, conventional AFM systems, based on piezoelectric tube scanners, have serious limitations in precision nanoscale metrology because of the background curvature and destructive imaging mode, so called ‘tapping mode’.

In order to overcome the non-linearity and the non-orthogonality associated with the conventional piezotube based AFM, we developed a new AFM platform [1] of completely decoupled, flexure based XY and Z scanners, which achieves a highly flat and linear XY scan, optimized for precision nanometrology. The high speed Z-scanner with minimized drive mass attains a fast Z-servo response, enabling the Non-Contact AFM for nondestructive imaging.

In addition, the separated z-scanner provides an ideal platform for adopting other SPM techniques, such as Near-field Scanning Optical Microscope (NSOM) and Scanning Ion Conductance Microscope (SICM). We also developed a new 3D AFM with adjustable Z scanner angle.[2] The 3D AFM can measure and image undercut structures as well as vertical sidewalls for the first time in AFM history.

[1] Joonhyung Kwon, Jaewan Hong, Yong-Seok Kim, Dong-Youn Lee, Kyumin Lee, Sang-min Lee, and Sang-il Park, Rev. Sci. Instrum. 74, 4378 (2003).

[2] to be published.