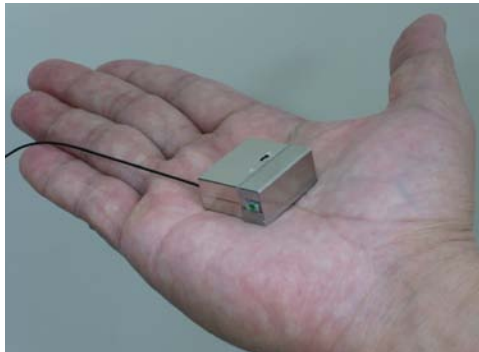
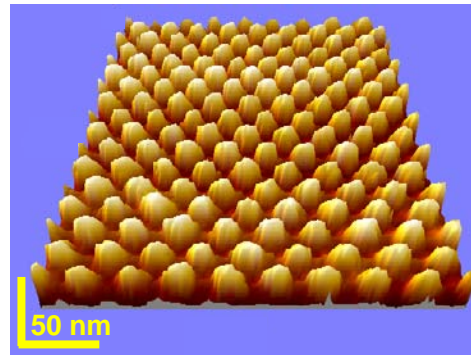


Ultrahigh-resolution AFM with a probe position resolution of 15 picometer



An ultracompact and highly sensitive interferometric displacement sensor



Measurement result of a 30nm pitch silicon dot pattern

Hitachi, Ltd. has developed an “ Atomic Force Microscope (AFM) ” which enables controlling of a probe position with a resolution of 15 picometer*(pm), one decimal place smaller than the atomic scale.

AFM measures three dimensional structures of a sample surface by tracing the surface using a microprobe mounted on a 3D probe scanner while detecting the 3D probe position with displacement sensors. The measurement accuracy of the AFM depends mainly on the sensitivity of the displacement sensor. One-inch sized interferometric displacement sensors with a 10 pm sensitivity has been developed, and by incorporating the sensors into a 3D probe scanner, the AFM is able to achieve a probe position resolution of as low as 15 pm.

*One picometer = one trillionth of a meter.

■ Characteristics

By applying “ photonic crystals ” as a reference mirror and phase shifter, a new common-path interferometry technology has been developed to reduce the effects of ambient fluctuations such as air disturbance and mechanical vibration.

■ Application

The developed AFM can be applied to magnetic head devices for next-generation HDD. Also, it can be applied to surface physics in which an individual atom is observed in a three dimensional field.

■ Conference presentation

The AFM was presented at the 71st Fall Meeting of the Japan Society of Applied Physics from 14th Sep to 17th Sep, 2010.

■ A word from the development team

The AFM has been recognized as a world-first achievement by authorities holding the basic patent for AFM detection. We will continue to work towards contribution in *Monozukuri* with Hitachi's nanotechnology capabilities.