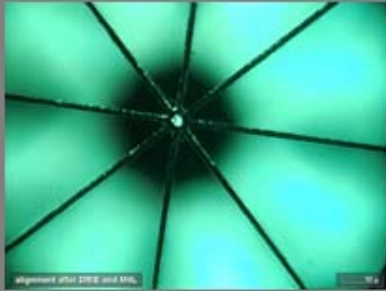


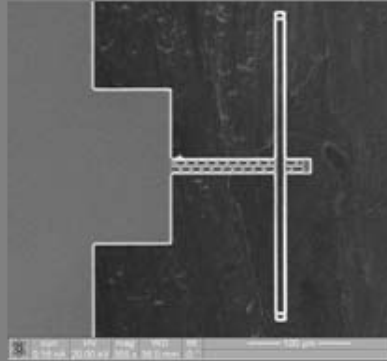
# Three Degrees of Freedom Atomic Force Microscope

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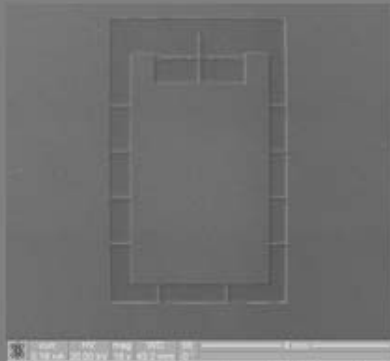
Atomic Force Microscopes are typically used to measure forces in one direction. They can be adapted to measure forces in other directions, but it is time intensive and challenging. Here we show a *Three Degrees of Freedom Atomic Force Microscope* design. Microfabrication techniques were used to design, fabricate, and test a miniature system that can measure forces in three directions with high resolution. Typical applications for the 3DOF AFM are probing nanostructures and studying hard disk drive interactions with the reading head.



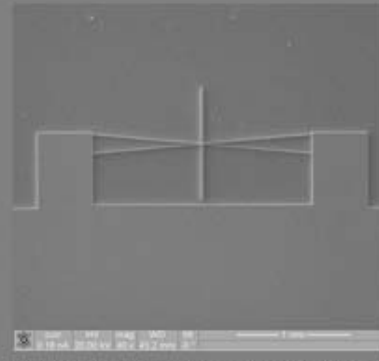
Alignment marker from backside mask after DRIE



FIB SEM image of a free standing Two Degree of Freedom AFM fabricated using this process



FIB SEM Image of Device 3 (two 2 $\mu$ m thick beams, 4 $^\circ$  angle) etched 10 $\mu$ m into a Si wafer



FIB SEM image of Device 4 (two 3 $\mu$ m thick beams, 10 $^\circ$  angle) etched 10 $\mu$ m into a Si wafer.