

**First sub-100 nm Nuclear Magnetic Resonance Imaging**

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Conventional magnetic resonance imaging (MRI) is limited to spatial resolution of a few micrometers because of sensitivity limitations of coil-based inductive detection. This year we demonstrated that ultrasensitive force detection can overcome this sensitivity limitation and allow magnetic resonance imaging to enter the nanoscale regime. Using sharp magnetic tips made of FeCo that produce field gradients over 14 gauss per nanometer, a two-dimensional magnetic resonance image with 90 nm spatial resolution was demonstrated. This represents a 60,000x improvement of volume sensitivity over conventional MRI, and a 70,000x improvement over previous MRFM nuclear spin imaging results. The results are to be published soon in the journal Nature Nanotechnology.

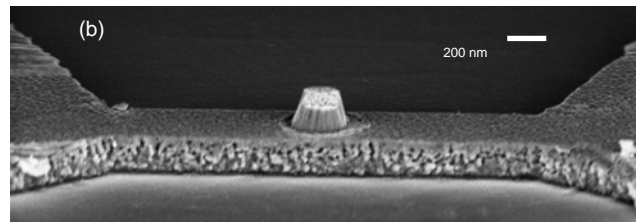
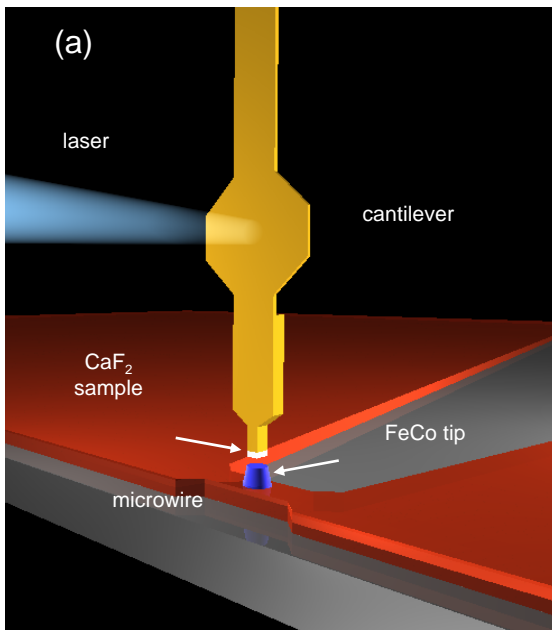


Fig. 1: (a) Diagram of sample-on-cantilever MRFM with microwire rf field source and integrated FeCo tip.

(b) Scanning electron micrograph of copper microwire with integrated magnetic tip.