



TECHNOLOGY

Inexpensive Room Temperature Operated High Sensitivity Scanning Magnetic Probe Microscope Using a Magnetolectric Device

OVERVIEW

This invention pertains to a new kind of ultrasensitive magnetic scanning probe microscopes using magnetolectric (ME) devices as the sensors. The magnetolectric device consists of a piezoelectric material and a magnetostrictive material. Through the elastic coupling of the two materials, extremely high sensitivity magnetic field detection has been demonstrated. The technology can be used as devices for scanning probe applications. These devices operate at room temperature, and thus the invention represents a new type of magnetic probe microscope that can be substantially less expensive than existing technology.

The sensitivity and the performance of the present invention are very competitive against the room temperature SQUID microscopes; despite the intrinsic sub pico tesla sensitivity of the SQUID itself, the room temperature microscopy implementation reduces the sensitivity to the order of 10 pico tesla. The present invention using microfabricated thin film ME devices will have higher spatial resolution than the room temperature scanning SQUID microscope and comparable or better magnetic field sensitivity.

A near-field room temperature scanning magnetic probe microscope has been developed using the sensor. The sensor shows an AC field sensitivity of $467 \pm 3 \mu\text{V/Oe}$ in the measured frequency range of 200 Hz to 8 kHz. The microscope was used to image a 2 mm diameter ring carrying an AC current as low as 10⁻⁵ A. AC fields as small as 3×10^{-10} T have been detected.

For Licensing information please contact the office of technology Commercialization at the University of Maryland 301 405-3947 or by e-mail otc@umd.edu

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Additional Information

INSTITUTION

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CATEGORIES

- Imaging devices

EXTERNAL RESOURCES

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