

High-Sensitivity Magnetic Sensor Application for NDE and Ultra-Fine Magnetic Recording

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Keywords Measurement engineering-related (21030), Control and system engineering-related (21040), Electron device and electronic equipment-related (21060)



Research Topics

- Fine magnetic field detection using STM-SQUID Microscopy
- NMR/NQR measurement
- Ultra-fine magnetic recording with scanning tunneling microscopy

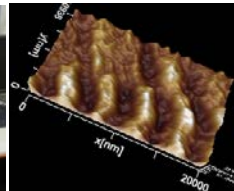
Research Seeds

Spintronics and electronics of nanostructures

We developed a STM-SQUID probe microscope. A SQUID probe microscope was combined with a STM. Both topography and magnetic image of the sample surface were measured simultaneously. The microscope can be used for ultra-fine magnetic recording by generating local field from the probe tip.



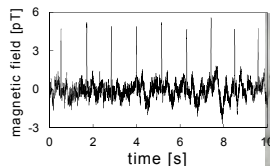
STM-SQUID microscope



Magnetic image of HDD

Field detection/generation for human health

We measured the magnetic field from a human heart with pico tesla order using an RF-SQUID magnetic sensor. We are corroborating with IFG Cooperation, Sendai. The magnetic stimulator "PathLeader" was developed. This has been used in rehabilitation for patients with paralysis of limbs caused by stroke.



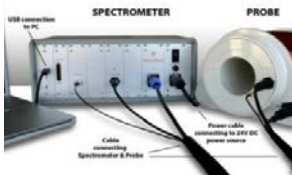
Heart magnetic field



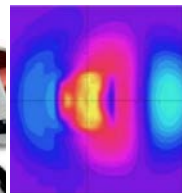
Magnetic stimulator

Nondestructive evaluation for safety

We developed NMR and Nuclear quadrupole resonance (NQR) measurement systems. We are developing nondestructive evaluation system to measure large samples and small samples.



NMR spectrometer



FEM simulation

Related Technology

- Field detection/generation for research on spintronics and electronics
- Finite element method simulation
- Analog and digital signal processing and automatic measurement system