

A Magnetic Flux-guide for HTS Scanning SQUID Microscopy : Its Characteristics and System Construction

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A magnetic flux-guide in the form of a sharp needle is known to enhance the spatial resolution of a scanning SQUID microscope. We investigated the properties of a soft ferromagnetic tip as a flux-guide by measuring the local stray field at the tip end using a scanning SQUID microscope. The effects of the flux-guide such as the transmission of magnetic signal, length dependence, magnetic hysteresis, and sensitivity were measured. We observed the magnetic signal was weakened exponentially as the tip length increased. At the sensitivity measurement, magnetic fields as weak as 4×10^{-6} Oe were enough to be detected by the magnetic tip. We also present the design and construction of a HTS scanning SQUID microscope with a flux-guide for room-temperature samples. As a demonstration, we took a magnetic image of hard disk surface and resolved a feature of $\sim 8 \mu\text{m}$.

keywords : SQUID, scanning SQUID microscope, flux guide, magnetic microscope, Barkhausen effect

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