

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

ESR-MRI Using Low-Temperature Magnetic Resonance Force Microscopy SHIGENORI TSUJI, TATSUYA FUJIMOTO, YOHSUKE YOSHINARI, JEOL Ltd., CREST, KOHSUKE INOMATA, Kyoto Univ., CREST — The low-temperature operation of Magnetic Resonance Force Microscopy (MRFM) leads to a significantly better signal-to-noise ratio (SNR) than at room temperature, because of an increase of the spin magnetization and a reduction of the thermo-mechanical noise of the cantilever. We have built a low-temperature equipment, which is capable of operating in vacuum at liquid helium temperature. Our setup employed the sample-on-cantilever design at present. A magnetic needle with $100\ \mu\text{m}$ in diameter was placed on a stage to generate magnetic field gradient $11.3\ \text{G}/\mu\text{m}$ at the magnetic field $714\ \text{G}$. The 3D closed-loop stage based on slip-stick principle allows a $200 \times 200 \times 200\ \mu\text{m}^3$ scan range with $50\ \text{nm}$ resolution. The experimental results of the 2D magnetic resonance force map carried out on diphenylpicrylhydrazil (DPPH) at $T = 14\ \text{K}$ are shown and an improvement of the SNR by 154 compared with the results at room temperature is confirmed. The 2D reconstructed images will be shown as well.

Shigenori Tsuji
JEOL Ltd., CREST

Date submitted: 27 Nov 2007

Electronic form version 1.4