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3D ESR-MRI with A Sub-Micrometer Resolution Using Magnetic Resonance Force Microscopy SHIGENORI TSUJI, YOHSUKE YOSHINARI, JEOL Ltd. and CREST-JST, Japan, KOSUKE INOMATA, Kyoto Univ. and CREST-JST, Japan — We will present our progress of ESR Magnetic Resonance Force Microscopy (MRFM). In order to improve our previously achieved resolution (2∼3 micrometer), we used an electropolished magnetic tip made of a sintered Nd2Fe14B permanent magnet, which generated a larger magnetic field gradient (8000 T/m) in the very vicinity of the magnetic tip. To avoid a collision between a sample glued on a cantilever and the magnetic tip placed on a 3D stage, the tip-sample direction was set parallel to the cantilever long axis. Magnetic resonance force signals were induced by a cyclic saturation technique. In this setup, the observed signals had an anti-symmetrical phase with respect to a plane that contains a specimen and is perpendicular to the vibrational direction of the cantilever. MRFM image was then reconstructed from the force map through FT deconvolution. At present, our MRFM can produce 3D ESR-MRI with a sub-micrometer spatial resolution.

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