

Magnetic Resonance Force Microscopy as a
Characterization Tool for Bio-Inspired Projects

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ABSTRACT:

Mechanical detection of magnetic resonance provides microscopy resolution exceeding any other technique. Current resolution of this technology is the detection of a single electron. Alterations in a sample's magnetic field alter the fundamental frequency of a micro-cantilever with an attached magnetic particle. The motion of the micro-cantilever is observed via an interferometer. A three dimensional map of the sample can be generated. The objective of the magnetic resonance force microscopy program at Army Research Labs is to provide a characterization tool for other projects, particularly bio-inspired projects. Uses include mapping locations of proteins in bacteria during reactions, measuring and locating hydrogen impurities in artificial diamonds, and determining the arrangement of polymer chains in thin films at the sub-micron level. The technology has profound implications for microbiology, to include the potential for mapping protein structures for samples *in situ*.

KEYWORDS: magnetic resonance force microscopy, magnetic resonance imaging, biotechnology, microbiology

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