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Composite Nanowire-Based Probes for Magnetic Resonance Force Microscopy MLADEN BARBIC, California State University, Long Beach, AXEL SCHERER, Caltech — We will present a nanowire-based methodology for the fabrication of ultra-high sensitivity and resolution probes for atomic resolution magnetic resonance force microscopy (MRFM). The fabrication technique combines electrochemical deposition of multi-functional metals into nanoporous polycarbonate membranes and chemically selective electroless deposition of optical nanoreflector onto the nanowire. The completed composite nanowire structure contains all the required elements for ultra-high sensitivity and resolution MRFM sensor with: (a) magnetic nanowire segment providing atomic resolution magnetic field imaging gradients as well as large force gradients for high sensitivity, (b) noble metal enhanced nanowire segment providing efficient scattering cross-section from a sub-wavelength source for optical readout of nanowire vibration, and (c) non-magnetic/non-plasmonic nanowire segment providing the cantilever structure for sensitive mechanical detection of magnetic resonance.

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