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**A Novel Scanning Near-Field Microwave Microscope Capable of High Resolution Loss Imaging** ATIF IMTIAZ, STEVEN ANLAGE, Center for Superconductivity Research, Dept. of Physics, University of Maryland, College Park, MD 20742 USA — To study novel physics in condensed matter and materials science, experimental techniques need to be pushed for better sensitivity and higher spatial resolution. Classical techniques of probing the high frequency electrical properties of materials are limited in resolution to the wavelength of the incident electromagnetic wave. We report here a novel near-field microwave microscope to image materials contrast, with 2.5 nm spatial resolution in capacitance. Our objective is to improve the spatial resolution in local loss imaging. We will present evidence of sheet resistance contrast in a Boron-doped Silicon sample on sub- micron length scales. We will present quantitative analysis of the data on the Boron-doped Silicon sample in light of evanescent wave model of the microscope that we have developed. In addition, the probe to sample interaction on nanometer length scales will be discussed [1]. This work has been supported by an NSF IMR Grant DMR-9802756, and the University of Maryland/Rutgers NSF-MRSEC through the Near Field Microwave Microscope Shared Experimental Facility Grant DMR-00-80008.
[1] Atif Imtiaz, Marc Pollak, Steven M. Anlage, John D. Barry and John Melngailis, "*Near-Field Microwave Microscopy on nanometer length scales*", to be published in J. Appl. Phys. (Feb. 1, 2005).

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