

Abstract Submitted  
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**Magnetic Force Microscopy of Superconducting Vortices in an Ordered Array of Artificial Pinning Centers**<sup>1</sup> JOEL KEAY, PRESTON LARSON, KEVIN HOBBS, MATTHEW JOHNSON, Dept. of Physics and Astronomy, University of Oklahoma, Norman, OK 73019, OPHIR AUSLAENDER, KATHRYN MOLER, Stanford University, JOHN KIRTLEY, IBM Research Division, Yorktown Heights — Ordered arrays of artificial pinning centers were fabricated in Nb thin films using anodic aluminum oxide (AAO) as a template. These artificial pinning arrays have a triangular lattice parameter of 105 nm and antidot diameters of about 50 nm. The nanohole arrays show only a small decrease in the superconducting transition temperature,  $T_c \simeq 7.1$  K, from comparable unprocessed Nb thin films. Enhancement of the magnetization at the first, second and third matching fields (matching field = 2170 Oe) were observed in the magnetization half-loops of these arrays at 5 K. Magnetic Force Microscopy (MFM) was used to image the nanohole arrays above and below  $T_c$ . These images clearly show the nanohole lattice. Individual vortices have been imaged at low fields and their movement within the lattice is being explored. Further, domain rings have been imaged at low and high fields at temperatures between 5 and 5.5 K. Their properties are currently being investigated.

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