

Transport and Magnetic Properties of Superconducting Nanomeshes Fabricated Using Porous Aluminum Oxide Templates

J.C. Keay, P.R. Larson, K.L. Hobbs, O.K. Awitor, S.Q. Murphy and M.B. Johnson
Dept. of Physics and Astronomy, University of Oklahoma, Norman OK 73019
J.R. Kirtley
IBM Research Division, Yorktown Heights

It is known that critical superconducting phenomena in thin films are enhanced with the introduction of artificial pinning centers (APCs) into the films. Additionally, matching field anomalies in the film resistance, critical currents and magnetic moments are observed. In this work, we have fabricated hexagonal arrays of holes in superconducting niobium thin films using porous anodic aluminum oxide templates. The hole diameters are 50 nm with an inner hole separation of 105 nm. Standard four-point measurements have been used to investigate the effect of the hole array on the longitudinal and transverse transport properties of the thin films. Results from these, and recent DC magnetometry measurements will be presented. This work was supported by NSF grant nos. DMR-0080054 and NSF-0132534.