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Evidence of Spatially Inhomogeneous Pairing on the Insulating Side of a Disorder-Tuned Superconductor-Insulator Transition K. H. SARWA B. TAN, KEVIN A. PARENDO, YEN-HSIANG LIN, ALLEN M. GOLDMAN, University of Minnesota, Minneapolis, MN 55455, USA — The effect of a perpendicular magnetic field on disordered, amorphous and insulating indium oxide thin films has been investigated. The temperature dependence of the resistance in zero magnetic field, the magnetoresistance as a function of temperature, and the nonlinear current-voltage characteristics have been interpreted as evidence of the presence of superconducting islands on the insulating side of a chemical and/or structural disorder-tuned superconductor-insulator transition. The behavior is very similar to that observed in granular films which are composed of macroscopic grains of superconductor embedded in an insulator. However, characterization studies indicate that the films are fully connected, structurally homogeneous, and not granular. These results support theoretical models in which the destruction of superconductivity by disorder produces spatially inhomogenous pairing with a spectral gap. This work was supported in part by the National Science Foundation under grant NSF/DMR-0455121.

K. H. Sarwa B. Tan
University of Minnesota, Minneapolis, MN 55455, USA

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