

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Measurements of superconducting energy gap in individual Ru islands embedded in Sr₂RuO₄ YIQUN YING, B. CLOUSER, R. MYERS, N. STALEY, YING LIU, Pennsylvania State University, D. FOBES, Z.Q. MAO, Tulane University, Y. XIN, Florida State University, L. ALLARD, Oak Ridge National Laboratory — We report our tunneling measurements on individual single-crystalline Ru islands embedded in a bulk Sr₂RuO₄ single crystal. Tunneling junctions were prepared on large (micron size) and small (submicron size) Ru islands by fabricating tunneling windows using quartz filaments as shadow masks. Our measurements revealed the presence of an energy gap below a temperature close to the T_c of bulk Ru. In the zero temperature limit, the gap was found to be 0.07 meV for large Ru islands, consistent with our measurements on bulk polycrystalline Ru. However, in small Ru islands a gap of 0.1 meV, clearly larger than that seen in large Ru islands, was observed. The difference in energy gap may reflect difference in pairing state in Ru islands of different sizes. Above the T_c of Ru but below the T_c of Sr₂RuO₄, we detected no proximity induced energy gap. This observation is unexpected as our Z-contrasted transmission electron microscope study showed that the interface between a Ru island and Sr₂RuO₄ is atomically sharp, which appears to rule out the suppression of the proximity effect by disorder. We argue that these observations are associated with chiral p-wave superconductivity in Sr₂RuO₄.

Yiqun Ying
Pennsylvania State University

Date submitted: 16 Dec 2008

Electronic form version 1.4