

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Tunneling spectroscopy studies of the interplay between s - and p -wave pairings in a Ru microdomain embedded in bulk single-crystal Sr_2RuO_4 ZHENYI LONG, CHRYSAFIS ANDREOUS, ZHIQIANG MAO, YOSHITERU MAENO, YING LIU, Department of Physics, Penn State University — We have performed detailed tunneling spectroscopy measurements on In-Ru/ Sr_2RuO_4 junctions prepared by pressing freshly cut pure In wire onto Sr_2RuO_4 single crystals containing Ru microdomains (the 3-K phase). We have observed a superconducting transition with a $T_c = 0.5$ K and an energy gap of 0.08 meV, both of which correspond to those of the bulk Ru. We have also observed a Josephson coupling between In and Ru, suggesting that conventional s -wave pairing is present in the Ru microdomains. On the other hand, a zero bias conductance peak (ZBCP) in the tunneling spectrum and an enhanced critical magnetic field over the bulk value for Ru were observed as well, indicating that p -wave pairing exists simultaneously in the Ru microdomain. The temperature and the magnetic field dependences of the tunneling spectrum suggest a non-trivial interplay of the s - and p -wave pairings and a novel phase modulation of the order parameter at the boundary of the Ru microdomain. We observed an oscillation of the Ru energy gap as the magnetic field is applied along the c axis of the Sr_2RuO_4 crystal. Such oscillation was not observed with the field applied along the ab plane. We will discuss the implication of the above observations in this unique superconducting system.

Haohua Wang
Department of Physics, Penn State University

Date submitted: 30 Nov 2005

Electronic form version 1.4