Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dislocations and the enhancement of superconductivity in odd-parity superconductor Sr_2RuO_4[1] YIQUN YING, NEAL STALEY, XINXIN CAI, YING LIU, Department of Physics and Materials Research Institute, The Pennsylvania State University, University Park, Pennsylvania 16802, USA, YAN XIN, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida 32306, USA, KAI SUN, Department of Physics, University of Michigan, Ann Arbor, Michigan 48109, USA, DAVID FOBES, TIJIANG LIU, ZHIQIANG MAO, Department of Physics, Tulane University, New Orleans, Louisiana 70118, USA — We investigated the 3-K phase of spin-triplet, odd-parity superconductor Sr_2RuO_4, which was usually referred to the eutectic phase of Ru and Sr_2RuO_4 featuring Ru islands embedded in single crystalline Sr_2RuO_4. Using single-crystal flakes of Sr_2RuO_4 of mesoscopic size free of Ru, we observed an enhancement of superconducting transition temperature (T_c) up to about twice of that of the bulk when lattice dislocations were found in the samples, a surprising result given the well known sensitivity of superconductivity in Sr_2RuO_4 to disorder. We formulated a phenomenological theory taking into account the crystalline as well as the pairing symmetry of Sr_2RuO_4 and showed that the enhanced T_c can be attributed to symmetry reduction in superconductors with a two-component order parameter. We found that our experimental results are consistent with the theoretical predictions.

[1]The work is supported by DOE under Grant No. DE-FG02-04ER4615

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Date submitted: 27 Nov 2012 Electronic form version 1.4