Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Enhanced Upper Critical Fields in a New Quasi-one-dimensional Superconductor $Nb_2Pd_xSe_5$ SEUNGHYUN KHIM, BUMSUNG LEE, KI-YOUNG CHOI, BYUNG-GU JEON, Department of Physics and Astronomy, Seoul National University, Seoul 151-747, Republic of Korea, EUN SANG CHOI, Natioanl High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida 32310, USA, KEE HOON KIM, Department of Physics and Astronomy, Seoul National University, Seoul 151-747, Republic of Korea, CENTER FOR NOVEL STATES OF COMPLEX MATERIALS RESEARCH TEAM, NATIONAL HIGH MAGNETIC FIELD LABORATORY COLLABORATION — We report a discovery of superconductivity with $T_c = 5.5$ K in $Nb_2Pd_xSe_5$ in which one-dimensional (1D) Nb-Se chains exist along the b-direction and each conducting chain is hybridized to form the conducting bc^* planes. Magnetic susceptibility and heat capacity data in both single- and poly-crystals constitute evidences of bulk superconductivity and BCS-type pairing mechanism. The zero temperature upper critical fields, $H_{c2}(0)$, of a single crystal are found to be 10.5, 35 and 22 T for a', b and c^* directions respectively. $H_{c2}(0)$ is clearly much larger than the expected Pauli limiting field $1.84T_c \approx 9$ T along the b and c^*-direction. We will discuss the possible explanations of such enhancement of H_{c2} via suppression the Pauli limiting effect, based on the large spin-orbit scattering and the quasi-1D nature of electronic structure in analogy to an organic superconductor $(TMTSF)_2X$ ($X = PF_6$, ClO_4) and a purple bronze $Li_{0.9}Mo_6O_{17}$.

Seunghyun Khim
Department of Physics and Astronomy, Seoul National University,
Seoul 151-747, Republic of Korea

Date submitted: 12 Nov 2012 Electronic form version 1.4