Supplementary Materials: Critical current density, vortex pinning, and phase diagram in the NaCl-type superconductors $InTe_{1-x}Se_x$ (x = 0, 0.1, 0.2)

Linchao Yu (于林超)[1†], Song Huang (黄嵩)[1†], Xiangzhuo Xing (邢相灼)[1,2*], Xiaolei Yi (易晓磊)[3], Yan Meng (孟炎)[4], Nan Zhou (周楠)[5], Zhixiang Shi (施智祥)[6*], and Xiaobing Liu (刘晓兵)[1,2*]

[1]School of Physics and Physical Engineering, Qufu Normal University, Qufu 273165, China

[2]Advanced Research Institute of Multidisciplinary Sciences, Qufu Normal University, Qufu 273165, China

[3]College of Physics and Electronic Engineering, Xinyang Normal University, Xinyang 464000, China

[4]Department of Physics, Jining University, Qufu 273155, China

[5]Key Laboratory of Materials Physics, Institute of Solid State Physics, HFIPS, Chinese Academy of Sciences, Hefei, 230031, China

[6]School of Physics, Southeast University, Nanjing 211189, China

[†] These authors contributed equally to this work.

[*] Corresponding authors. Email: xzxing@qfnu.edu.cn, zxshi@seu.edu.cn, and xiaobing.phy@qfnu.edu.cn

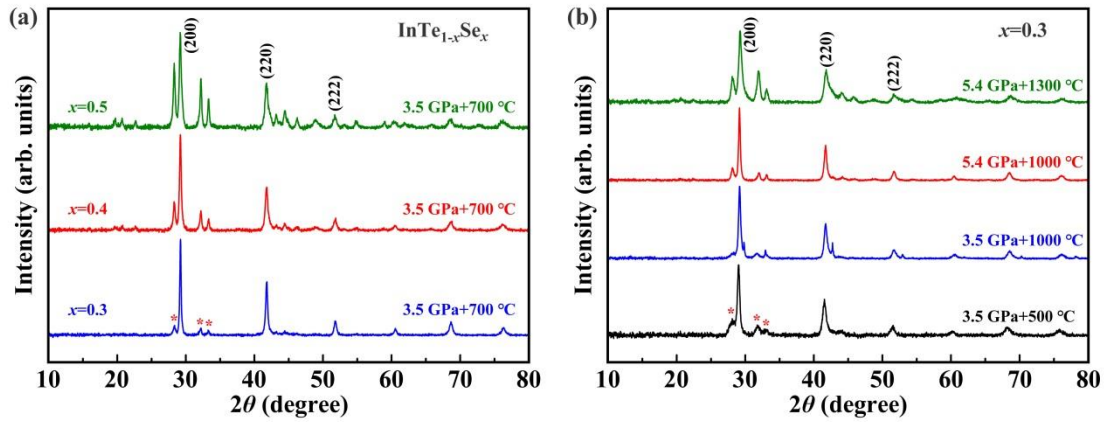

Fig. S1. (a) Powder XRD patterns of $InTe_{1-x}Se_x$ (x = 0.3, 0.4, 0.5) synthesized with the same conditions as $InTe_{1-x}Se_x$ (x = 0, 0.1, 0.2) at P=3.5 GPa and T= 700℃. (b) Powder XRD patterns of $InTe_{1-x}Se_x$ (x = 0.3) synthesized at various pressure and temperature conditions. It can be clearly seen that the position of diffraction peaks indexed by a NaCl-type structure are almost unchanged when x > 0.3. Meanwhile, amounts of impurity phases denoted by the red stars can be visible, despite adjusting the synthesis conditions. These indicate that the Se solubility limit is at around x ~ 0.2.

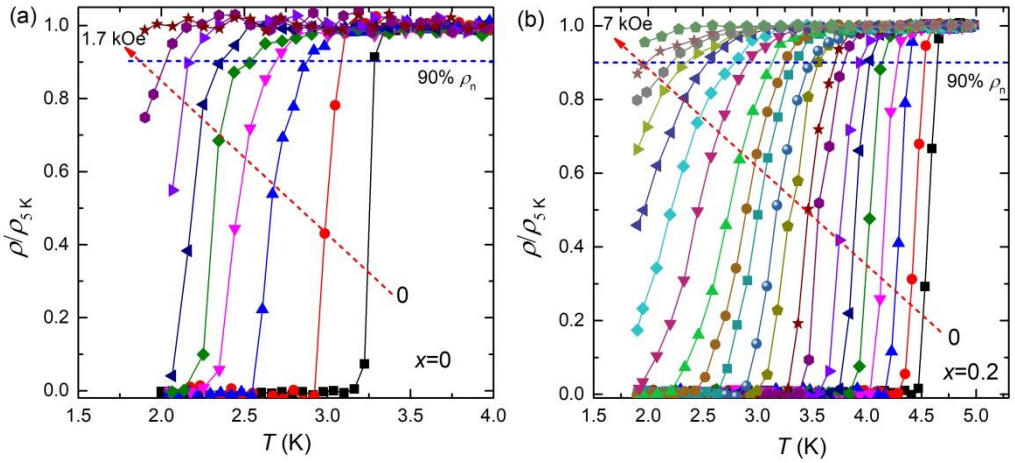

Fig. S2. $\rho/\rho_{5\,K}$ as a function of temperature under various applied fields for (a) InTe and (b) $InTe_{0.8}Se_{0.2}$.

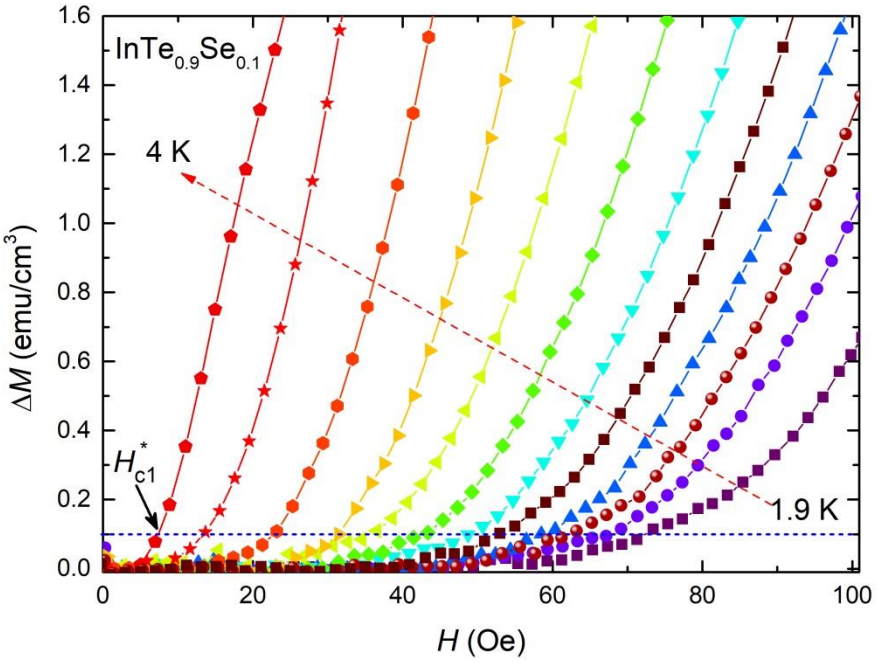

Fig. S3. The deviation ΔM of the M(H) data from the Meissner line at various temperatures for $InTe_{0.9}Se_{0.1}$. The values of H^*_{c1} were determined by the field where the deviation $\Delta M(H)$ from the Meissner line is greater than 0.1 emu/cm^3, as indicated by the blue dashed line. The same criterion was also adopted for InTe and $InTe_{0.8}Se_{0.2}$.