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Effects of Oxygen Annealing in Fe(Te,Se) Single Crystals TSUYOSHI TAMEGAI, YUE SUN, TOSHIHIRO TAEN, YUJI TSUCHIYA, Department of Applied Physics, The University of Tokyo, ZHIXIANG SHI, Department of Physics, Southeast University — Iron-chalcogenide superconductor Fe(Te,Se) has the simplest structure among all iron-based superconductors. Yet, its superconducting properties except for T_c are not very much reproducible. This is partly due to the fact that the as-grown crystals of Fe(Te,Se) is not superconducting, and post-annealing is important to induce superconductivity. We found that the annealing in a controlled oxygen atmosphere is very important to induce superconductivity in this system. Upon annealing in oxygen atmosphere, the content of excess iron in the crystal decreases. We will demonstrate the dynamics of the oxygen annealing process by changing the annealing time and temperature. We also compare the effect of different annealing conditions, such as vacuum annealing, with that of oxygen annealing. Finally, physical properties of well-characterized Fe(Te,Se) crystals are discussed together with the vortex physics in this system.

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