Single crystal growth and superconductivity of Fe-Te-Se materials¹ G.D. GU, JINSHENG WEN, ZHIJUN XU, M. ENOKI, Z.W. LIN, QIANG LI, J.M. TRANQUADA, Brookhaven National Laboratory — A number of Fe-base superconducting materials with critical superconducting temperature up to 56K have been discovered in 2008. Fe-Te-Se is “11” system superconductor which has the simplest crystal structure. We have grown a number of the FeTe\(_{1-x}\)Se\(_x\) single crystals (x = 0~0.7) by using a Bridgman growth technique. The effects of the growth condition and the composition of a feed rod on the single crystal growth of Fe\(_{1+y}\)Te\(_{1-x}\)Se\(_x\) have been studied. The single crystals of the PbO-type tetragonal structure Fe\(_{1+y}\)Te\(_{1-x}\)Se\(_x\) with high extra Fe (ie y>0) are not superconducting. When Se substitutes for Te in FeTe\(_{1-x}\)Se\(_x\) single crystals, the superconducting transition temperature increases with increasing Se content. The maximum Tc of FeTe\(_{0.5}\)Se\(_{0.5}\)is 15K.

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