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Anisotropy and effects of oxygen deficiencies in single crystals of superconducting $Sr_2VFeAsO_3$ TAKAO SASAGAWA, TAKAO KATAGIRI, Tokyo Institute of Technology, HIROMI KASHIWAYA, SATOSHI KASHIWAYA, National Institute of Advanced Industrial Science and Technology — With a series of different oxygen deficiencies, single crystals of $Sr_2VFeAsO_3$ were successfully grown by a self-flux technique in an evacuated double quartz tube. Highly anisotropic properties were observed in the mixed state. From the angular dependence of the resistivity at various temperatures and fields, the anisotropy parameter ($= H_{c2}^{//ab}/H_{c2}^{//c}$) was quantitatively evaluated by using the anisotropic Ginzburg-Landau theory. The obtained value for the optimally doped crystal (with almost no oxygen deficiencies) amounts to 25, which is several times higher than other typical iron-based superconductors and comparable to the cuprate superconductor $(La,Sr)_2CuO_4$. In crystals with sufficient oxygen deficiencies, a ferromagnetic transition was found to appear above the superconducting transition. Upon increasing the oxygen deficiencies, a monotonic increase of the Curie temperature together with counter suppression of superconductivity was observed. In oxygen deficient crystals, it is highly likely that a natural superlattice with the periodic stack of superconducting FeAs and ferromagnetic Sr_2VO_3 layers, corresponding to SFS Josephson junctions, is realized.

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