Anisotropy and Vortex Pinning of Heavy Ion irradiated SmFeAsO$_{0.8}$F$_{0.15}$ and BaFe$_2$(As$_{1-x}$P$_x$)$_2$ Crystals$^1$ WAI-KWONG KWOK, LEI FANG, CARLOS CHAPARRO, YING JIA, ULRICH WELP, ALEXEI KOSHELEV, SHAOFEI XU, Argonne National Laboratory, GEORGE CRABTREE, Argonne National Laboratory and University of Illinois at Chicago, JANUSZ KARPINSKI, ETH, Zurich — We report specific heat and magnetization measurements on SmFeAsO$_{0.8}$F$_{0.15}$ and BaFe$_2$(As$_{1-x}$P$_x$)$_2$ single crystals irradiated with high energy heavy ions of 1.4GeV Pb to dose matching fields up to 4 Tesla. We find a nearly one half reduction in the superconducting anisotropy and doubling of the irreversibility field in SmFeAsO$_{0.8}$F$_{0.15}$ after irradiation and virtually no change in the zero-field superconducting transition temperature. In both SmFeAsO$_{0.8}$F$_{0.15}$ and BaFe$_2$(As$_{1-x}$P$_x$)$_2$ crystals, we find a substantial increase in the critical current determined from SQUID and micro-Hall probe magnetization measurements. Pinning force analysis on proton and heavy ion irradiated pristine overdoped BaFe$_2$(As$_{1-x}$P$_x$)$_2$ crystals indicates presence of induced $\Delta T_c$-type pinning defects in these samples.

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