Bromine-doping dependence of crystal structure and superconductivity in FeSe$_{1-x}$Br$_x$\(^1\) Y.T. SHEN, S.C. CHEN, K.J. SYU, W.H. LEE, Department of Physics, National Chung Cheng University, W. H. LEE TEAM — Our experimental data indicate that the crystal structure formation in FeSe$_{1-x}$Br$_x$ is dependent on the amount of Br. For the samples with \(x\) between 0.18 and 0.3, the single tetragonal $\beta$-FeSe phase with space group P4/nmm could be obtained by carrying out the low-temperature (400 °C) annealing after reaction at 680 °C. As to the sample with \(x = 0.1\), a heat firing at 680 °C is in favor of forming single hexagonal $\delta$-FeSe phase with space group P6$_3$/mmc. Powder x-ray diffraction and crystallographic data provide the suggestion that the $\beta$ tetragonal PbO-type phase is related to the superconducting state while the $\delta$ hexagonal NiAs-type phase has no effect on the superconductivity. Magnetization data confirm the bulk character of the superconducting state with a $T_C$ around 5 K. Larger superconducting volume fraction appears in the single-phase sample with $x$ near 0.2.