

## **Impact of growth conditions, chemical substitutions, and pressure on superconducting properties of $\text{FeTe}_{1-x}\text{Se}_x$ single crystals**

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Superconducting single crystals of pure  $\text{FeTe}_{1-x}\text{Se}_x$  and  $\text{FeTe}_{0.65}\text{Se}_{0.35}$  doped with Co, Ni, Cu, into Fe ions site were studied. It was found that the sharpness of transition to the superconducting state in  $\text{FeTe}_{1-x}\text{Se}_x$  is evidently inversely correlated with crystallographic quality of the crystals. It was noticed that small disorder introduced into magnetic sublattice, by partial replacement of Fe ions by slight amount of nonmagnetic ions of Cu ( $\sim 1.5$  at%) or by magnetic ions of Ni ( $\sim 2$  at%) and Co ( $\sim 5$  at%) with spin value different than that of Fe ion, completely suppresses superconductivity. This indicates that even if superconductivity is observed in the system containing magnetic ions it can not survive when the disorder in magnetic ions sublattice is introduced, most likely because of magnetic scattering of Cooper pairs. For  $\text{FeTe}_{0.65}\text{Se}_{0.35}$  single crystals, the pressure-induced enhancement of the critical temperature, the lower and upper critical fields was found. It was noticed that the increase in superconducting carrier density under pressure is more pronounced than the increase in transition temperature what may indicate an appearance of a mechanism limiting the increase of  $T_c$  with pressure.