

Superconducting Transitions and Crystal Structure for FeSe_{1-x}S_x ($x=0.1, 0.2,$ and 0.3) under Pressure.

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Fe-based superconductor FeSe has the simplest structure in all categories of Fe-based superconductors and has a record of maximum T_c in '11'-type structure since the T_c has been raised from 8 K to 37 K under pressure around 6 GPa.¹ This shows the change of T_c is very sensitive to pressure. Then, we studied the external pressure effect of nearly optimal S doping of FeSe, FeSe_{1-x}S_x ($x=0.1\sim 0.3$), where the substitution of Se by smaller S into FeSe introduces chemical pressure and gives the maximum $T_c = 11$ K at $x=0.2$. These T_c are checked by the resistivity measurements under pressure up to 8 GPa using both the piston cylinder and cubic anvil cell. As a result of these pressure experiments of FeSe_{1-x}S_x, the phase diagrams are determined. In the phase diagrams of $x=0.2$ and 0.3 , it is observed that T_c slightly decreases with application of pressure up to 0.6 GPa. But the T_c jumps up above 0.6 GPa and reaches to $T_c(x=0.2)=36.3$ K under 6 GPa. The behavior of T_c in the region of $P \leq 0.6$ GPa are unconventional. We will discuss the unconventional behavior from the crystal structure given by X-ray under pressure.

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