

Pressure Dependence of Superconductivity in FeSe Studied by DC Magnetic Measurements

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Pressure dependence of superconductivity in FeSe ($T_c \sim 8$ K) has been investigated by DC magnetic measurements under high pressure using miniature diamond anvil cell combined with commercial SQUID magnetometer. High quality specimens with nominal composition FeSe_x ($x=0.80-1.00$) were prepared from iron pieces and selenium shot as described in the literature.¹ In the specimens, no impurity phase of hexagonal FeSe was identified. It has been found that T_c increases in two steps for the composition range of $0.80 \leq x \leq 0.98$ by the application of pressure, showing a local maximum of T_c (~ 11 K) at $P \sim 1$ GPa and a saturation at $T_c^{\text{max}} = 15-20$ K above $P \sim 3$ GPa. The T_c-P curve is qualitatively similar to those previously determined using specimens prepared from Fe and Se powders^{2,3} but T_c^{max} in the specimens is 25–30 K, fairly higher than that in the present specimens. It has been also found that the T_c-P curve for $0.99 \leq x \leq 1.00$ also becomes nearly constant of $T_c^{\text{max}} = 15-20$ K above 3 GPa but does not show a local maximum at ~ 1 GPa, contrasting to the specimens for $0.80 \leq x \leq 0.98$. The origin of the sample dependence in the T_c-P curve will be discussed.

¹T.M. McQueen *et al.*, Phys. Rev. B **79**, 014522 (2009).

²K. Miyoshi *et al.*, J. Phys. Soc. Jpn. **78**, 093703 (2009).

³H. Okabe *et al.*, Phys. Rev. B **81**, 205119 (2010).