Pressure-tuned superconductivity of iron chalcogenides

LILING SUN, Institute of Physics, CAS, XIAO-JIA CHEN, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D.C., JING GUO, PEIWEN GAO, Institute of Physics, CAS, HANGDONG WANG, MINGHU FANG, Department of Physics, Zhejiang University, China, XIAOLONG CHEN, GENFU CHEN, QI WU, DACHUN GU, CHAO ZHANG, XIAOLI DONG, XI DAI, Institute of Physics, CAS, HO-KWANG MAO, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D.C., ZHONGXIAN ZHAO, Institute of Physics, CAS — In this talk, we present our recent progress in effect of pressure on superconductivity of newly discovered iron chalcogenide superconductors. We show that the either positive or negative pressure can tune superconductivity of this new kind of superconductors. Superconductivity with higher superconducting transition temperature $T_c$ can reemerge after elimination of the initial superconducting phase upon compression. We find that the maximum $T_c$ of the reemerging superconducting phase is as high as 48.7 K for $K_{0.8}Fe_{1.70}Se_2$ and 48 K for $Tl_{0.6}Rb_{0.4}Fe_{1.67}Se_2$, setting a new $T_c$ record for chalcogenide superconductors. The presence of the second superconducting phase is proposed to be related to pressure-induced quantum criticality. Our findings open up the potential route for the exploration of high-$T_c$ superconductivity in iron-based and other superconductors.

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Date submitted: 08 Nov 2011