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Retaining Superconducting Phases Through Low Temperature Pressure Quenching[1] TREVOR BONTKE, LIANGZI DENG, RABIN DAHAL, University of Houston, YU XIE, BIN GAO, XUE LI, KETAO YIN, None, MELISSA GOOCH, DONALD ROLSTON, University of Houston, TONG CHEN, None, ZHENG WU, University of Houston, YANMING MA, PENGCHENG DAI, None, CHING-WU CHU, University of Houston — In the past 5 years the discovery of superhydride systems with critical temperatures (T_cs) that approach and exceed room temperature has pushed the field to new heights. Unfortunately, to achieve room temperature superconductivity (RTS) requires pressures in excess of 260 GPa. One of the greatest challenges remaining in field of superconductivity (SC) is retaining RTS while lowering or removing pressure. As a potential solution, we developed a low temperature pressure quenching technique which successfully retained SC phases in Bi, and FeSe and $Cu_xFe_{1-x}Se$. Quenching at 77 K and 4.2 K from pressures up to 23.6 GPa we retained Bi phases with varying T_cs corresponding to Bi II, III, and V. Similarly, we retained SC phases with T_cs up to 38 K in FeSe and 27 K in $Cu_xFe_{1-x}Se$. Furthermore, the retained SC phase of $Cu_xFe_{1-x}Se$ was shown to be stable for at least 7 days when kept at 77 K. Finally, stability testing of Bi revealed a robust SC phase with T_cs corresponding to Bi-III (T_c 7.1 K) while displaying the transient nature of other retained SC phases of Bi.

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