

Discovery of High Pressure Co-Bi Materials

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The transition metal (TM)-bismuth intermetallic phase spaces host fascinating emergent properties such as permanent magnetism and superconductivity. Yet the phase landscape is underexplored due to the limited TM-Bi reactivity at ambient pressures. It was reported superconducting CoBi₃ forms at 5-10 GPa, a result suggesting further investigation at higher pressures may unveil more compounds with superconducting properties like the Ni-Bi system. Yet Co has one less electron than Ni, opening the possibility of Co-Bi exhibiting permanent magnetism similar to MnBi. Through a combined experimental and computational approach, we explored Co-Bi at pressures greater than 18 GPa and discovered two new phases, CoBi and CoBi₂. Future work aims to determine their persistence down to ambient pressure and measure their physical properties