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**Crystal growth, complex phase diagram and high pressure studies of layer compound $PdBi_2$**[1] KUI ZHAO, Texas Center for Superconductivity and Department of Physics, University of Houston, XIYU ZHU, BING LV, YUYI XUE, PAUL CHU[2], Texas Center for Superconductivity and Department of Physics, University of Houston, Houston, TX 77204-5002 — Among the different Pd-Bi Alloys, $\beta$-$PdBi_2$, which is crystallized in a layered tetragonal (I4/mmm) structure, has been identified as a superconductor with transition temperature at $\sim$ 5.4K. Band structure calculation indicates that the interlayer Bi-Bi bonds are weak but not negligible, which implies the 3D bonding character of this compound. In order to enhance or weaken the interlayer bonding and ultimately increase the Tc in this system, high pressure measurement, isovalent chemical substitution of Bi with Sb, and chemical intercalation using transition metal Cu and alkali metal Na, are applied to the system. Meanwhile, aliovalent chemical substitution on the Bi site by Pb is also carried out. The magnetic, electrical, and calorimetric properties of these compounds are determined at ambient pressure and compared. The detailed high pressure results and the complete phase diagram of chemical substitution and intercalation will be presented and discussed.

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