Abstract Submitted
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Superconductivity in the New Electron-correlated 122-layer System CaT_2Ge$_2$ (T = Ir, Pd, Pt)[1] H.C. KU, C.H. HUANG, C.W. CHEN, Y.B. YOU, M.F. TAI, National Tsing Hua University, Y.Y. HSU, National Taiwan Normal University — Superconductivity were observed in the new 122-layer compounds $CaIr_2Ge_2$ ($T_c = 5.4$ K) and $CaPd_2Ge_2$ ($T_c = 2.5$ K) with the $BaFe_2As_2$-type body-centered-tetragonal structure (bct, space group $I4/mmm$). For the pseudoternary $Ca(Ir_{1-x}Pt_x)_2Ge_2$ system, superconducting transition T_c decreases from 5.4 K for $CaIr_2Ge_2$, to 3.8 K for $x = 0.1$, 3.0 K for $x = 0.2$, 2.7 K for $x = 0.3$, 2.2 K for $x = 0.5$, and below 2 K for $x > 0.5$. In addition to the 122-bct phase, x-ray powder diffraction pattern shows the appearance of a non-superconducting 122-monoclinic phase (space group $P2_1$). No T_c above 2 K was observed for the single-phase monoclinic compound $CaPt_2Ge_2$. Higher T_c in the bct $CaIr_2Ge_2$ is due to a strong quasi-2D $5d_{xz,yz}$-$4p$-$5d_{xz,yz}$ hybridization in the Ir-Ge-Ir layer with the squeezed-along-c-axis $IrGe_4$ tetragonal crystal field and the Ir-5d spin-orbital interaction. For the 11-orthorhombic precursor $(Ir_{1-x}Pt_x)Ge$ (space group $Pnma$), T_c decreases from 4.8 K for IrGe, to 3.6 K for $x = 0.1$, 2.3 K for $x = 0.2$, and below 2 K for $x \geq 0.3$, with a reported low T_c of 0.4 K for PtGe.

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