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Superconductivity in $LaPd_{1-x}Bi_2$ and moderate heavy fermion behavior in antiferromagnetic $CePd_{1-x}Bi_2$ FEI HAN, DUCK YOUNG CHUNG, MERCOURI KANATZIDIS, Argonne Natl Lab — Superconductivity at 2.1 K is observed in $LaPd_{1-x}Bi_2$. A small residual resistance ratio indicates a strong scattering effect induced by Pd vacancies. Hall effect measurements reveal electron-like carriers and single-band transport behavior in $LaPd_{1-x}Bi_2$. Band structure calculations support the possibility of Fermi surface nesting near the fully stoichiometric case in $LaPd_{1-x}Bi_2$. By creating Pd vacancies the Fermi surface nesting is avoided which suppresses any potential CDW on the Bi net. $CePd_{1-x}Bi_2$ is non-superconducting but shows antiferromagnetic ordering below 6 K. A Sommerfeld coefficient of 0.199 J.mol$Ce^{-1}K^{-2}$ reveals a moderate heavy fermion behavior in $CePd_{1-x}Bi_2$. The resistivity curve shows the presence of Kondo and crystalline-electric-field effects. Magnetoresistance and Hall effect measurements show the interplay between Kondo and crystalline-electric-field effects obviously reconstructs the Fermi surface topology of $CePd_{1-x}Bi_2$ around 75 K. With the help of band structure calculations, we argue the f-d hybridization in $CePd_{1-x}Bi_2$ quenches the superconductivity.

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