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Hole Doped SrPt3P - Physical Characterization and Analysis[1]

BENMAAN JAWDAT, BING LV, YUYI XUE, CHING-WU CHU[2], Texas Center for Superconductivity and Department of Physics, University of Houston — In 2012, Takayama et al. [1] reported superconductivity up to 8.4 K in APt_3P (A = Sr, Ca, and La). Its crystal structure is similar to that of the noncentrosymmetric superconductor $CePt_3Si$, although it possesses a center of inversion symmetry. Afterwards, Nekrasov et al. predicted in a theoretical work that hole doping the system would increase $N(\epsilon_f)$ as well as the T_C [2]. We have therefore decided to investigate Si-doped $SrPt_3P$ resistively, magnetically and calorimetrically. We found that 1. the partial replacement of P by Si results in hole-doping evidenced from our Hall measurements, within the solubility of Si in $SrPt_3P$, 2. The Sommerfeld coefficient of the compounds increases with Si-doping, and 3. the T_C decreases with Si-doping, in contrast to the theoretical prediction. The results will be presented and discussed together with results of other chemical doping in progress.

[1] Takayama, T. et al. Strong Coupling Superconductivity at 8.4 K in an Antiperovskite Phosphide $SrPt_3P$. Physical Review Letters 108, 237001 (2012).
[2] Nekrasov, I. A. & Sadovskii, M. V Electronic Structure of New Multiple Band Pt-Pnictide Superconductors APt_3P 1, 1-5 (2012).

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