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Interplay of Superconductivity and Spin Density Wave - Magnetism in PrFeAsO and Hole-doped ($\text{Pr}_{1-x}\text{Sr}_x$) FeAsO: Synthesis, Structure, Thermodynamic, Magnetic, Transport, Phonon properties and Pressure effect KALYAN SASMAL, CHING-WU (PAUL) CHU, Texas Center for Superconductivity Department of Physics, University of Houston, TX, USA — Hole doping in iron-pnictide (1111) PrFeAsO by substituting Pr^{3+} by Sr^{2+} creates superconducting $\text{Pr}_{1-x}\text{Sr}_x\text{FeAsO}$ tetragonal P_4/nmm phases at room temperature. Sr doping facilitate hole transfer through Pr/Sr plane & FeAs layers. Hall-effect measurements at different magnetic field & temperature (+Ve R_H) confirms hole like charge carriers. Lattice constants (a & c) increase monotonously with Sr/hole concentration. T_c (SC) varies from 12.5 K to 15.5K with a maximum of 15.5K at $x = 0.22$ with (optimal doping) largest SC volume fraction. Temperature (1.7 K ~300K) & Magnetic field (1T~7T)-dependent resistivity, magnetic susceptibility & specific heat been measured & calculated C_p/T (J/mole-K²) & entropy (J/mole-K). Thermoelectric power S (T) of PrFeAsO have W-like shape & smaller amplitude with much larger spread. p -drop (~150 K) has been identified with SDW/ lattice instability. Coexistence of SC & SDW behavior were observed & pressure effects on both being investigated by resistivity measurements under hydrostatic pressure up to 1.8GPa using piston-cylinder clamp cell device & compared with electron doped $\text{Sm}(\text{O}_{1-x}\text{F}_x)\text{FeAs}$. T_c increases (+ dT_c/dP) with pressure for under-doped ($\text{Pr}_{1-x}\text{Sr}_x$)FeAsO similar to high- T_c cuprates & -Ve pressure effect on SDW temperature. The results suggest a symmetry between electron & hole-doping Fe-pnictide superconductors.

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