

## High Pressure Study on Iron-based Arsenic-oxide $\text{ReFeAsO}_{1-\delta}$ (Re=La, Ce, Pr, Nd, Sm, Gd and Tb)

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A novel class of superconductors prepared by high pressure synthesis in the quaternary layers-structure  $\text{ReFeAsO}_{1-\delta}$  (Re= La, Ce, Pr, Nd, Sm, Gd and Tb) family without fluorine doping have been studied. By replacing La with small Re atom from Ce to Sm, the onset superconducting critical temperature in these compounds increases whereas decreases with substitution of Gd and Tb. The highest  $T_c$  that was obtained up to now is 55 K in  $\text{SmFeAsO}_{1-\delta}$ , which is the highest among all materials except for the multi-layered copper oxides. For the  $\text{NdFeAsO}_{1-\delta}$  system with different oxygen concentration that we studied, a dome-shaped phase diagram was found. Moreover, pressure effect on superconducting transition temperature of  $\text{ReFeAsO}_{0.85}$  (Re= Sm and Nd) system was studied in a diamond anvil cell. *In-situ* resistance measurements under high pressure showed that the pressure coefficient  $dT_c/dP$  in  $\text{SmFeAsO}_{0.85}$  and  $\text{Nd FeAsO}_{0.85}$  were different. Theoretical calculations indicated that the difference is related to a modification of the density of state.

Key words:  $\text{ReFeAsO}_{1-\delta}$ , Superconductivity, High Pressure