Microscopic, Transport and Thermodynamic properties of \( \text{Ca}_{10}(\text{Pt}_3\text{As}_8)((\text{Fe}_{1-x}\text{TM}_x)_{2}\text{As}_2)_5 \) (TM=Co, Ni) single crystals

SHAN JIANG, NI NI, Univ of California - Los Angeles — Here we report detailed microscopic, transport and thermodynamic measurements on two series of high quality single crystals \( \text{Ca}_{10}(\text{Pt}_3\text{As}_8)((\text{Fe}_{1-x}\text{TM}_x)_{2}\text{As}_2)_5 \) (TM=Co, Ni). With electron doping on Fe sites, the structural/magnetic phase transitions in the parent compound were suppressed at a rate of roughly -7K per 0.01Co doping and -9K per 0.01Ni doping. Superconductivity emerges in the region of \( 0.048 < x < 0.20 \) for Co doping with optimal \( T_c \) of 13.5K (\( x = 0.11 \)) while it occurs in the region of \( 0.035 < x < 0.11 \) for Ni doping with optimal \( T_c \) of 9.6K (\( x = 0.064 \)). No coexistence of AFM and SC is observed, which is different from the well-studied 122 Fe-pnictides but reminiscent the one of La1111. The comparison of the effect between Co- and Ni- doping on 10-3-8 shows that rigid band approximation is likely working for these two dopants in this superconducting family.