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High T_c electron doped $Ca_{10}(Pt_3As_8)(Fe_2As_2)_5$ and $Ca_{10}(Pt_4As_8)(Fe_2As_2)_5$superconductors[1] NI NI, JARED M. ALLRED, Chemistry department, Princeton University, BENNY C. CHAN, Department of Chemistry, The College of New Jersey, ROBERT J. CAVA, Chemistry department, Princeton University, NI NI, J. M. ALLRED, R. J. CAVA TEAM, B. C. CHAN COLLABORATION — In this talk, we will present the crystal structures and physical properties of two new iron arsenide superconductors, $Ca_{10}(Pt_3As_8)(Fe_2As_2)_5$ (the "10-3-8 phase") which crystallizes in the triclinic structure and $Ca_{10}(Pt_4As_8)(Fe_2As_2)_5$ (the "10-4-8 phase") which crystallizes in the tetragonal structure. They are very similar compounds for which the most important differences lie in the structural and electronic characteristics of the intermediary platinum arsenide layers. Electron doping through partial substitution of Pt for Fe in the FeAs layers leads to T_c of 11 K in the 10-3-8 phase and 26 K in the 10-4-8 phase. The anisotropic H_{c2} measurement indicates the multiband superconductivity in these compounds. The often-cited empirical rule in the arsenide superconductor literature relating $T_c$to As-Fe-As bond angles does not explain the observed differences in T_c of the two phases; rather, comparison suggests the presence of stronger FeAs interlayer coupling in the 10-4-8 phase due to the two-channel interlayer interactions and the metallic nature of its intermediary Pt_4As_8 layer. The interlayer coupling is thus revealed as important in enhancing T_c in the iron pnictide superconductors.

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