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Relationship between structure anisotropy and T_C and phase diagram of $AFe_2(As_{1-x}P_x)_2$ (A=Ba, Sr, Ca) TORU ADACHI, TATSUYA KOBAYASHI, SHIGEKI MIYASAKA, SETSUKO TAJIMA, MASAYOSHI ICHIMIYA, MASAAKI ASHIDA, Osaka Univ., REIJI KUMAI, HIRONORI NAKAO, YOUICHI MURAKAMI, KEK PF/CMRC — We investigated how the electronic phase diagram changes when the crystal structure changes in $AFe_2(As_{1-y}P_y)_2$ where A =Ba/Sr or Sr/Ca. In this study, we synthesized the single crystals of $Ba_{0.5}Sr_{0.5}Fe_2(As_{1-x}P_x)_2$, $Sr_{0.92}Ca_{0.08}Fe_2(As_{1-x}P_x)_2$ and $Sr_{0.84}Ca_{0.16}Fe_2(As_{1-x}P_x)_2$, measured the resistivity and determined precise structure parameters using synchrotron X-ray, then elucidated their phase diagrams and detailed crystal structures. The phase diagram of A =$Ba_{0.5}Sr_{0.5}$ system is similar to those for A =Ba and Sr, while for A =Sr/Ca systems the superconducting phase appears at a smaller P content than the case for A =Ba and Sr. The important finding is that the maximum T_C values are almost the same in all $AFe_2(As_{1-y}P_y)_2$systems. From the X-ray structural analysis, it has been revealed that in the optimally doped crystals, the local structures of $FeAs_4$ tetrahedra such as pnictogen heights or bond angles of As-Fe-As are almost the same, whereas the anisotropy of the crystal structures,c/a, systematically changes. We conclude that T_C is not affected by the anisotropy (c/a) but strongly depends on the local structure such as the pnictogen height.

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