Abstract Submitted
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Strong anisotropy in the electromagnetic properties of $Na_2Ti_2X_2O$ (X = As, Sb) crystals YOUGUO SHI, NANLIN WANG, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, EX1 OF INSTITUTE OF PHYSICS, CHINESE ACADEMY OF SCIENCES TEAM — $Na_2Ti_2X_2O$ (X = As, Sb) crystals have been grown from the flux method. X-ray diffraction characterization revealed an anti-K_2NiF_4-type layered structure (tetragonal, space group $I4/mmm$) for both compounds. Magnetic susceptibility ($\chi(T)$) and electrical resistivity ($\rho(T)$ measurements revealed major kinks at 115 K (T_{s1}) and 320 K (T_{s2}) for $Na_2Ti_2Sb_2O$ and $Na_2Ti_2As_2O$, respectively, signifying possibly the opening of density wave gaps. Both $Na_2Ti_2Sb_2O$ and $Na_2Ti_2As_2O$ showed remarkably strong anisotropy in their electromagnetic transport properties, and values of $\gamma_\rho(\rho_c/\rho_{ab})$ even reached 140 and 430, respectively, being much larger than that of iron pnictide $BaFe_2As_2$(γ_ρ = 2–5). The $\gamma\rho$of $Na_2Ti_2Sb_2O$ changed slightly with cooling, though a small drop at T_{s1} occurred. In contrast, the γ_ρ of $Na_2Ti_2As_2O$ changed strikingly by exhibiting not only a small change at T_{s2} but also a sudden decrease of 50 K, reduced nearly 1/3. Specific heat measurement indicated that $Na_2Ti_2Sb_2O$ was only partially gapped with $\gamma_1 = 4.1$ mJ mol^{-1} K^{-2}, though a long-range order was established at T_{s1}, while $Na_2Ti_2As_2O$ was fully gapped. The remarkably strong electromagnetic anisotropy revealed in $Na_2Ti_2X_2O$ suggests the crucial role of the TiO_2X_4 layer for the transport properties of layered titanium oxypnictides.

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