

Abstract Submitted  
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**Sign-changing nodal  $s$ -wave gap in heavily over doped  $(\text{Ba}_{1-x}\text{K}_x)\text{Fe}_2\text{As}_2$  evidenced from thermal-transport measurement** DAIKI WATANABE, SHIGERU KASAHARA, TAKUYA YAMASHITA, TAKUMI OTA, TAKASADA SHIBAUCHI, YUJI MATSUDA, Department of Physics, Kyoto University, MINORU YAMASHITA, RIKEN, HIDETO FUKAZAWA, TAKU SAITO, YOH KOHORI, Department of Physics, Chiba University, SHIGEYUKI ISHIDA, KUNIHIRO KIHU, CHUL-HO LEE, AKIRA IYO, HIROSHI EISAKI, AIST, Tsukuba, ANTON VORONTSOV, Department of Physics, Montana State University — The superconducting state of hole-doped Fe-based superconductors,  $(\text{Ba}_{1-x}\text{K}_x)\text{Fe}_2\text{As}_2$ , changes from a fully-gapped state near the optimally doping ( $x \sim 0.5$ ) to a nodal one at the end material ( $x=1$ )[1,2]. Here we report the results of thermal-transport measurements for heavily overdoped  $x=1, 0.93, 0.88, 0.76$  crystals and discuss the doping evolution of the superconducting gap. For  $x=0.88, 0.93$  and  $1$ , the  $T$ -dependence of thermal conductivity in zero field shows a finite  $\kappa_0/T$  in the zero-temperature limit. In low magnetic fields,  $\kappa/T$  ( $T \rightarrow 0$  K) increases as  $\propto \sqrt{H}$ . These results indicate the presence of gap nodes in the gap function. We find that the residual  $\kappa_0/T$  exhibits a non-monotonic  $x$ -dependence, which is inconsistent with  $d$ -wave symmetry. We show that the observed  $x$ -dependence can be explained by nodal  $s$ -wave pairing with sign change between zone centered hole pockets. [1] K. Hashimoto *et al.*, Phys. Rev. B **82**, 014526 (2010). [2] K. Okazaki *et al.*, Science **337**, 1314 (2012).

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