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Temperature-dependent anisotropic resistivity in electron, hole and isoelectron - doped $BaFe_2As_2$ superconductors[1]

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Anisotropic electrical resistivity, $\rho(T)$, was studied in iron-arsenide superconductors, obtained by doping the parent $BaFe_2As_2$ compound on three different sites: (1) electron donor transition metal (Co,Ni,Rh,Pd) substitution of Fe [1,2]; (2) hole donor K substitution of Ba [3]; (3) isoelectron P substitution of As. For all three types of dopants a range of T-linear behavior is found at the optimal doping in both the in-plane and the inter-plane $\rho(T)$ above T_c. At some higher temperature this range of T-linear resistivity is capped by a slope-changing anomaly, which, by comparison with NMR, magnetic susceptibility and Hall effect measurements, can be identified with the onset of carrier activation over the pseudogap [1]. The doping-evolution of anisotropic temperature dependent $\rho(T)$ and of the pseudogap are quite different for three types of doping. A three-dimensional $T-H$ phase diagram summarizing our results will be presented. Furthermore, potential correlation of the anisotropic normal state transport and anisotropic superconducting state heat transport will be discussed.

In collaboration with N. Ni, A. Thaler, S.L.Bud'ko, P.C. Canfield, R. Prozorov, Bing Shen, Hai-Hu Wen, K. Hashimoto, S. Kasahara, T. Terashima, T. Shibauchi and Y. Matsuda.

[1] M.A.Tanatar et al. PRB **82**, 134528 (2010)
[2] M.A.Tanatar et al. PRB **84**, 014519 (2011)
[3] M.A.Tanatar et al. arXiv:1106.0533

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