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The Ni and Co substitutions in iron chalcogenide single crystals[1]
V.L. BEZUSYY, D.J. GAWRYLUK, A. MALINOWSKI, M. BERKOWSKI, MARTA Z. CIEPLAK, Institute of Physics PAS, Warsaw — We study the *ab*-plane resistivity and Hall effect in $Fe_{1-y}M_yTe_{0.65}Se_{0.35}$ single crystals with M=Co or Ni, and y up to 0.2. The crystals are grown by Bridgman's method. The low-temperature Hall coefficient R_H changes sign to negative for crystals with y exceeding 0.135 (Co) and 0.06 (Ni), consistent with the electron doping induced by these impurities. However, the R_H remains positive for all samples at high T, suggesting that remnant hole pockets survive the doping, but the holes become localized at low T in heavily doped crystals. Superconducting transition temperature (Tc) approaches zero for y = 0.14 (Co), and 0.03 (Ni), while the resistivity at the Tc onset is only weakly affected by Co doping, but it increases strongly for the Ni. These results suggest that in case of Co impurity the Tc suppression may be attributed to electron doping. On the other hand, the Ni substitution, in addition to electron doping, induces strong localization effects at small impurity contents. Using two-band conduction model we argue that the localization of electron carriers is responsible for strong superconductivity suppression by Ni impurity.

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