Poster Presentation

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Evolution of magnetic and crystal structure of FeTe doped with Cr and Ni

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Due to inherent phase separation, it has been so far impossible to grow ideally stoichiometric (1:1) tetragonal (P 4/n m m) iron telluride. The excess iron ions are located in the inter-planar positions and usually represented as a fraction x in a general formula Fe1+xTe [1], where x ranges from about 4% to 17%. The additional iron has been found to negatively correlate with the level of anion site doping and subsequently with hindering the superconductivity (SC), for example in the Fe(Te,Se,S) [2] series, where SC can be induced by doping with selenium or small amounts of sulfur. A binary Fe1+xTe orders magnetically into incommensurate magnetic structure with the transition temperature and crystal structure in the magnetic state depending on the excess iron. For x<0.12 a monoclinic (P 21/m) distortion was observed and for x>0.12 an orthorhombic one (P m m n). In our work, we attempted to create and investigate compounds electronically equivalent to variable iron stoichometry by substituting Fe with chromium (3d electron deficient) or nickel (3d electron rich). Single crystal samples several millimeter in size were grown by solidification from melt method in the substitution range 0.025 to 0.1 and only in the case of nickel the incorporation of dopant into host lattice was confirmed. Despite low effective Cr content in the single crystal form [3], neutron powder diffraction (NPD) of polycrystaline specimens revealed systematic decrease of long range magnetic moment and gradual suppression of monoclinic (M) distortion in both series. In the Cr doped series, the structure evolved through a mixed phase region into orthorhombic (O) one (Fig. 1), whereas in the nickel system a complete restoration of tetragonal symmetry was found. The suppression of magnetic ordering and lack of the structural distortion did not result in the SC. This work is supported by the Polish National Science Centre grant No 2011/01/B/ST3/00425

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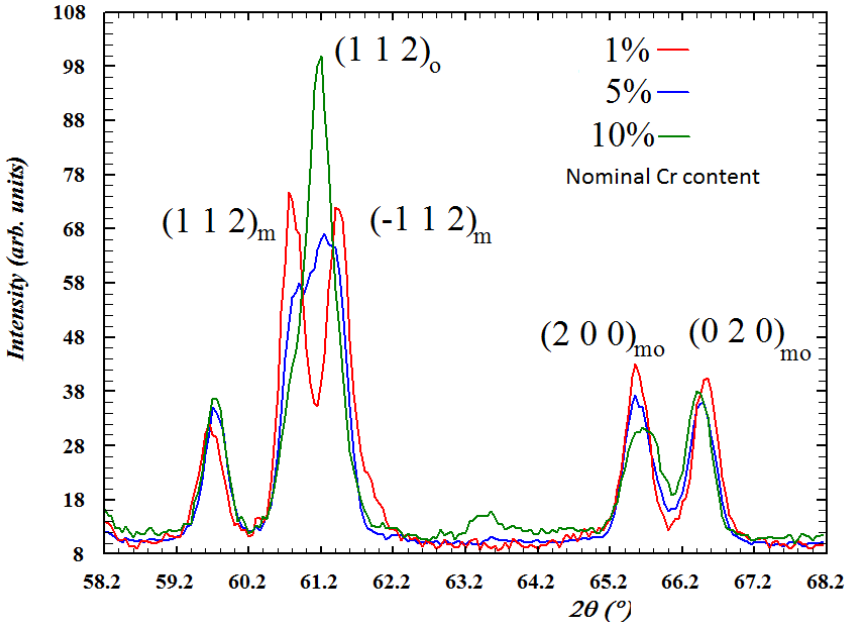

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