Some Thermal Properties of $Yb_{14}MnSb_{11}$ and its Solid Solutions $Yb_{14-x}RE_xMnSb_{11}$ type (RE- La, Pr, Sm, Gd, Tb, Ho, Lu)

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Data on structure, melting temperatures, density, thermal dilatation of $Yb_{14}MnSb_{11}$ and its solid solutions with rare earth elements are presented in this works. $Yb_{14}MnSb_{11}$ and their solid solutions are high-temperature, thermoelectrical materials. From the position of thermoelectrical materials thermal stability of these materials is also functional property since the exploitation of the material is carried out under high temperatures, where diffusion, volatility, oxidation processes easily occur. Due to this the results of melting temperature and thermal dilatation of $Yb_{14}MnSb_{11}$ and its solid solutions with some RE are presented in the present work. Crystals were obtained by melt-solution method using tin as a solvent. X-ray structural study of single samples was conducted on the apparatus DRON-UM (R=192мм, CuKa-radiation, Ni-filter, scintillation detector with amplitude discrimination, step 0,02° 2q, impulse storage time in each point 3c, room temperature) in the region of angles from 5 to 80° 2q.

1. Thermal stability of crystals was studied by high heating rate thermomicroscopic method analysis and it was found that compound .$Yb_{14}MnSb_{11}$ and their solid solutions is melt at decomposition.

2. Density was measured by microburette method using dissolved air free ethyl alcohol as a liquid.

3. Thermal expansion was measured in cylindrical samples about 4 mm in diameter, 10-13mm long the temperature range 25-750°C using a high-temperature dilatometer. Function $\Delta L/L_0$- f(T) is linear for all materials that indicate the constant coefficient of thermal dilatation α in this region of temperatures .To obtain information on chemical link stability characteristic temperature Debye and mean-square substitution in crystal were calculated.

Thermal expansion coefficients, melting temperatures and Debye temperatures evidences of changes after composition of RE – 0.45-0.7 characteristics. Probably it can be explained by that fact that solubility limit of RE in this compound switches to this concentration.

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