RHOMBOHEDRAL - CUBIC PHASE TRANSITION CHARACTERIZATION OF (Pb,Ge)Te USING HOT-STAGE XRD

J. Sariel[1], Y. Gelbstein[2], I. Dahan[1], O. Ben-Yehuda[3]

1. Nuclear Research Center, Negev, POBox 9001, Beer-Sheva, Israel, 84190.
2. Dept. of Materials Engineering, Ben-Gurion University of the Negev, Beer-Sheva, Israel, 84105.
3. Dept. of Physics, Ben-Gurion University of the Negev, Beer-Sheva, Israel 84105.

Tellurium alloys are well known for their optical properties. Ge-Te alloys have been reported as fast switching, reversible, phase-change optical data storing media. The compound GeTe, which is known for thermoelectric applications as well, is a *p*-type semiconductor. Additions of Bi_2Te_3 and PbTe to GeTe give the pseudo-binary alloys $Pb_{1-x}Ge_xTe$, doped with small amounts of Bi_2Te_3. The influence of these additions on the physical properties is currently under investigation. This communication is focused on the rhombohedral-cubic transformation in Bi_2Te_3 doped- $Pb_{1-x}Ge_xTe$ alloys.

PbTe has a cubic NaCl type structure, while GeTe attains this structure only at the elevated temperatures, but on cooling, it transforms into a slightly distorted NaCl structure, with trigonal symmetry. The transition temperature, *T*c, is near 400^{o}C, and depends on the exact composition. Disagreement exists as to whether this process is discontinuous or continuous, and therefore about the possibility that this is of second order.

Samples of Bi_2Te_3 doped $Pb_{1-x}Ge_xTe$ were prepared by powder metallurgy approach. These powder samples were examined by hot-stage XRD and SEM/EDS. A bulk (pressed powder) cylindrical specimen was used for dilatometery examinations.

Along the heating of the powder samples from room temperature to 500°C, and cooling back to room temperature in the hot-stage, **gradual** changes were detected in the diffracted spectrum. These changes include merging and splitting back of peaks and appearance and disappearance of new peaks. These changes together with other findings of the SEM/EDS and dilatometry examinations will be presented and discussed.