# Synthesis and Properties of High-Efficiency Thermoelectric Materials basis on the Systems Pb-Ag-Sb-Te

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In recent years, the issue of improving the efficiency of conversion of thermal energy into electrical energy gained special importance in connection with the realization exhaustion of fossil fuels and significant emissions into the atmosphere during combustion of harmful gases that pollute the environment, damage the ozone layer and cause global climate change .

The efficiency of thermoelectric materials is determined by the figure of merit (ZT):

$$ZT = \left( \frac{S^2 \sigma}{k} \right) T,$$

where S, σ, k, T Seebeck coefficient, electrical conductivity, thermal conductivity and absolute temperature, respectively. Modern TEG are based on materials with $ZT \approx 1$. Increase of this parameters complicated interconnectivity with values S, σ, k.

The abstract presents the results of research and X-ray measurements of thermoelectric parameters (Seebeck coefficient S, electrical conductivity σ and thermal conductivity k) materials based on Lead Telluride: PbTe, PbTe:Sb, PbTe-$Sb_2Te_3$, $Pb_{18}Ag_1Sb_1Te_{20}$, $Pb_{18}Ag_2Te_{20}$ and PbTe-$Ag_2Te$. Established that the highest values of thermoelectric figure of merit have PbTe: Sb (0.3 at.%) and system $Pb_{18}Ag_1Sb_1Te_{20}$, $Pb_{18}Ag_2Te_{20}$, in the first case due to a significant increase in the electrical conductivity of the material, and the other two - as an increase in the Seebeck coefficient and significant reduction in thermal conductivity compared to pure PbTe.

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