Ghitu Institute of Electronic Engineering and Nanotechnologies, Republic of Moldova

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Title	**The Single-crystal Bi–Sn nanowires for use as the branch of low-temperature energy converters**
Authors	**Albina Nikolaeva,Leonid Konopko, Pavel Bodiul, Ivan Popov, Gheorge Para**
Institution	**Ghitu Institute of Electronic Engineering and Nanotechnologies, Chisinau MD-2028, Moldova Republic**
Patent no.	**Patent MD 1537 Z 2021.12.31 Material termoelectric pe baza de bismut**
Description EN	The aim of this work was to prepare *p*-type nanowires exhibiting high thermoelectric efficiency for use in miniature thermoelectric power converters in a temperature range of 70–100 K. Glass-insulated single-crystal Bi–0.02at%Sn wires with diameters of 80 nm to 1 μm were prepared by liquid-phase casting in accordance with the Ulitovsky method. It was found that, as a result of size quantization, a semimetal–semiconductor transition occurs in thin Bi–0.02at%Sn wires with a significant dependence of the energy gap on wire diameter *d*; therefore, the thermoelectric power (value and sign) significantly depends on the localization of the Fermi level and exhibits a nonmonotonic dependence on wire diameter *d*. The maximum positive thermoelectric power value, and the force factor occur at *T* = 80–100 K. in thin wires. Taking into account that the thermal conductivity in Bi and $Bi_{1-x}Sb_x$ wires and films will decrease due to the surface scattering of carriers, they can be used as *p*-branches in low-temperature energy converters, particularly as micro-coolers in a temperature range of <100 K. The cooling of infrared detectors to these low temperatures will provide a significant increase in their detectability.