

## Contacts and overall information about institution

<b>Name of Organisation:</b>	Vasyl Stefanyk Precarpathian National University		
City	Ivano-Frankivsk	Zip Code:	76018
Street	Shevchenka, 57		
<b>Status of Organisation:</b>	Higher education establishments (University, etc.)		
<b>Name of Research Unit:</b>	Physical-Chemical Institute		
<b>S &amp; T Activity Fields:</b>			
FP7 Priorities	Nano Sciences, Nano Technologies, Materials and New Production Technologies		
Frascati classification	1. Natural Sciences		
Description of activities	<p>Development and perfecting of crystals and films growth technologies of AIBVI and AIVBVI compounds.</p> <p>Examination of a complex of crystals and films physical-chemical properties which have been grown at different technology factors and next exterior influences.</p> <p>Embodying of computer programs for calculation of equilibrium concentrations dependences of charge carriers and dot defects.</p> <p>Optimization of growth technology and exterior factors (thermal annealing in vacuum and atmosphere of oxygenium, radiative handling, doping), that ensure the given type of conductivity, concentration both mobility of carriers and high thermoelectric parameters necessary for devices of optical and a microelectronics.</p>		
<b>Website:</b>	<a href="http://www.pu.if.ua/inst/phys_che">http://www.pu.if.ua/inst/phys_che</a>		
<b>Overall Description of Institute (Research Unit)</b>	<p>We develop the effective technology of lead telluride n- and p-type of conductivity reception, set influence technological factors growing on thermo-electric properties material, find out the most optimum alloying the admixtures lead telluride from the point view thermo-electricity. The technological aspects of project include the choice of modes synthesis material from components and alloying admixtures for the receipt of alloys n- and p-type of conductivity, next terms homogenizing annealing (temperature, time), milling and selection factions of certain size, realization hot-pressed in the preforms the</p>		

proper size (depending on technological factors).

The research side of work foresees determination complex of thermo-electric parameters of material, got at different technological factors, and also their temperature dependence. In addition a necessary task is establishment conformities to the law in these dependences and explanation of their physical and chemical nature.

The next stage is an increase efficiency of the probed materials by a way then the directed alloying. Most perspective is alloying the probed materials by the admixtures of elements by V group of the Periodic table (Bi, Sb) of Chemical Elements. On this stage the complex of researches, related to theoretical description and engineering imperfect subsystem, development technology alloying materials of PbTe:Bi(Sb), is planned.

From other side, promoting thermo-electric good quality is possible the management of growing material by technological modes. The study of transport phenomena allows to forecast the temperature and concentration limits prevailing certain mechanisms dispersion of transmitters charge. Therefore, on the basis analysis of the phenomena transfer it is possible to set the technological modes for creation materials with the beforehand set properties, in particular, to develop technologies materials with dominant carrier scattering on phonons.

Thus, the association all of the higher resulted tasks enables to optimize technological processes for the receipt of materials with high thermo-electric descriptions.

**Head of Research Unit:**

Name:

Position Title:

Work Phone:

Other Phone:

Fax:

Email:

**Contact Person of Research Unit :**

Name:

Work Phone:

Other Phone:

Fax:

Email:

## Resources and international Activities

**Number of Researchers in Unit:**

**Research Facilities:**

Equipment for electronic-microprobe analysis  
Equipment for X-ray spectroscopy (SMR-18, and SMR-25)  
Equipment for X-ray phase analysis  
Equipment for growth of the monocrystals and thin films by physical and chemical

depositions  
Equipment for X-ray structural analysis  
Equipment for electrical and photo-electrical measurements  
Equipment for heat measurements  
Equipment for Mossbauer effect study (AVANCE 300, Germany)  
Equipment for electronic paramagnetic resonance study  
The complex of the spectrum measurements of photo-electrical sample parameters  
Equipment for time relaxation measurements of photo- charge carriers  
Equipment for integral barrier structure characteristics measurements (included contact fields)

**Number of International Projects:**

3

**Name and Number of major Publications:**

1. Surface microstructure and optical properties of PbTe films on semiconductor and dielectric substrates / A.N. Harbachova, G.E. Malashkovich, D.M. Freik, R.I. Nykyruy, G.P. Shevchenko // Chemistry Metals and Alloys – 2010, V3. №3/4. – P.45–51.
2. Technology of nanostructures of thermoelectric semiconductor compounds IV-VI / D.M. Freik, M.A. Lopjanko, B.S. Dzundza, R.I. Nykyruy // Thermoelectricity. – 2010 – №3 – P.52–61.
3. Patent of Ukraine # 79638. Receiving Method for Semiconductor Nanocrystals

**Participation in 7th Framework Programme:**

Food, Agriculture, Fisheries and Biotechnology:

Energy:

Environment (Including Climate Change):

Health:

Information and Communication Technologies:

Nano Sciences, Nano Technologies, Materials and New Production Technologies:

Security

Socio-economic Sciences and the Humanities

Space

Transport (Including Aeronautics)

Capacities

**Other international project experience:**

Project CRDF (USA) # UKX2-9200-IF-08 "Creation and functioning on the base of Vasyl Stefanyk PreCarpathian National University Science&Education Centre «Nanomaterials in accumulation and generation of energy devices»" (2009-2011)