

QUESTIONNAIRE

(*) – mandatory fields

	Details about organisation
* Organisation name	Petre Melikishvili Institute of Physical and Organic Chemistry
Organisation acronym	IPOC
* Organisation Activity Type (RES - Research, HE - University, SME - Small and Medium Enterprise, IND - Industry, OTH - Other)	RES
* Keywords of main research areas	Chemistry of Solids, Chemical Ecology, Polymers, Agricultural Chemistry, Oil Chemistry,
* Head of organization (first name, family name)	Vladimer Tsitsishvili
* Post code	0186
* Country	Georgia
* City	Tbilisi
* Street, House	5, Jikia str.
* Telephone (+ country & city codes)	(+995-32)-54 15 68
* Fax (+ country & city codes)	(+995-32)-54 15 68
* E-mail	physorgchem@pochta.ru

* Description of organisation and its research achievements for the last five years (~ 5000 signs)
<p>In 1929 the first scientific-research Institute of chemistry was founded in Georgia now it is LEPL Petre Melikishvili Institute of Physical and Organic Chemistry.</p> <p>The scientific work of the Institute involves the sphere of physical and organic chemistry. The major scientific directions are as follows: adsorption, catalytic and colloid-chemical processes; petroleum chemistry; synthesis, properties and structure of biologically active substances; high-molecular compounds; studies and application of synthetic and natural zeolites; problem of chemical ecology.</p> <p>Director of the Institute is Corresponding Member of the Georgian National Academy Vladimer Tsitsishvili. The Institute has two members of the Academy – academicians G. Tsitsishvili and T. Andronikashvili, 12 doctors of Chemistry Sciences and 71 PhD.</p> <p>Traditionally the Institute is the declared scientific leader in the field of zeolite study and application. On the base of the study of diverse physical-chemical properties of new natural materials, adsorbents and ion-exchange agents the scientific bases were developed for the synthesis and modification of micro- and meso-porous molecular sieves and materials. On the grounds of the obtained fundamental scientific results the various topological type zeolites were synthesized and the possibility of their application in various spheres of national economy were defined.</p> <p>The advantage of the application of carbon dioxide over the helium as a mobile phase in capillary chromatography was proved. The super-selective immobile phases were obtained by the introduction of cadmium and mercury cations in liquid crystalline</p>

phase. Method of determining the anions in waters at the excess of hydro carbonate content was developed on the base of the method of ion chromatography.

The methods of obtaining the bio-coordination compounds containing bio-metals, medical preparations and amino acids were developed.

New anti-pyrene was obtained, which doesn't suffer reduction at high temperature by the formation of smoke and toxic elements. It, doesn't change the material color and texture, is not washed out from the material. The antiseptic possessing anti-microbial properties was synthesized on the base of phosphate composition.

In the sphere of chemical ecology the scientific bases were created for characterization of low-molecular bio-regulators realizing communications between the organisms in ecological systems and for the counter synthesis. Experimental enterprise was created, which has been fulfilling the orders of agricultural and forestry organizations.

Methods were elaborated for the improvement of ecological indices of chemical and petro-chemical products, for the fight against various environment pollutants and together with the means for transformation of non-conditional military wastes into useful products. It should be stated that technological scheme of works implemented under the aegis of OSCE formed the basis for realization of analogous works in the neighboring countries.

The new types of filled in aminoplasts were prepared on the base of diatomite, varying its properties in wide interval. Creation of technologies of preparation of the pelleted multi-component encapsulated polymer compositions of seeding material of cereal crops, made it possible to encapsulate simultaneously with the seeding material the micro-and macro fertilizers, fungicide, stimulator and other urgent ingredients, thus providing increase of the harvest, protection of environment from pollution and high economic effect at the expense of significant decrease of the norms of nitrogen fertilizers.

Various aromatic, fragrant compounds, biologically active preparations, precious additives, medical bases and others were obtained on the base of secondary metabolites extracted from Georgian vegetable material, from the products of multi-tonnage chemical industry by the use of new methods of chemical synthesis.

	Contact Information
* Contact person (first name, family name)	Avtandil Dolidze
* Department / Laboratory	IPOC, Laboratory of Chemical Ecology
* Position	Head of Scientific Council
* Qualification and research experience	Professor
* Post address (house, street, city, code, country)	0186, 5 Jikia str., Tbilisi, Georgia
* Telephone (+ country & city codes)	(+995-32)-54 15 65
* Fax (+ country & city codes)	(+995-32)-54 15 65
* E-mail	avtodolidze@yahoo.com

International co-operation / Participation in EU RTD programmes or other bilateral / multilateral actions INTAS, TACIS, TEMPUS, COST, EUREKA, other RTD programmes (please specify programme/s, project title/s and year/s)
None

	* Please, use “X” to indicate the scientific area/s of your potential project
CHEMISTRY	X
SOCIAL AND HUMAN SCIENCES	
ECONOMIC SCIENCES	
ENGINEERING SCIENCE	
ENVIRONMENT	X
AGRICULTURE AND FOOD	X
HEALTH	
MATHEMATICS	
INFORMATION SCIENCE	
PHYSICS	
NANOTECHNOLOGIES	X
ENERGY	
TRANSPORT	
SPACE	

* Summary of potential research project envisaged hosting of European researcher for the period of between 1 and 2 years
<p style="text-align: center;"><u>Protect Population from Abandoned Chemical and Explosive Residues Negative Influence</u></p> <p>The geographical location, existing circumstances (conflict situation, inside and outside the country, serious threat of terrorism in the region, so-called problematic states are in the neighborhood of the country). Complicated social-economical and political situation gives ground for Chemical dangerous compounds impact. After Russian troops withdrawal the military-toxic wastes, contaminated territories, etc. were abandoned in Georgia.</p> <p>A lot of military bases were situated in Georgia, as in boundary country, during Soviet Union and after collapsing Soviet Union Russian Army military bases took place. Currently, inactive objects are left without observance. Due to local population non-sanctioned actions, these territories become abnormally dangerous.</p> <p>In 20th century, 30-yy arsenic ore reprocessing enterprises were operating nearby Georgia-Russia border. Produced arsenic acid anhydride was transported in Russian, for preparation chemical weapon (Luisite). The technology was very simple and never provided the total taking out of arsenic. The local population expresses anxiety. The</p>

spreading of acute diseases in the region the local population connects with arsenic containing wastes. Correspondingly, the social tension increases.

Currently, at Caucasian mountain South decline 60 000 tones of arsenic containing wastes (5-7%) are gathered. The sources of rivers that flowing into the Black Sea are located at this spots. The arsenic level gradually increases in the Black Sea, that is a hazard not only for Georgia, but for other Black Sea countries as well.

In last century, 80-yy Tbilisi suburban areas, obsolete and useless pesticides burials were abandoned, that contains high toxic chloro organic compounds. 1000 tone of wastes are located in open areas that creates really very serious threat for population.

The purpose of the project is the protection of population from the military and industrial wastes, due to their monitoring and further utilization. The working team has a great experience in performing similar work.

At first stage the research of dangerous residues impact on environment and detailed definition of rehabilitation work volume are appropriate. According to the obtained results the project dealt with residues decontamination and contaminated territories rehabilitation will be worked out with correspond budget.

Subdivisions of Soviet Military troops have been located almost in every region of Georgia. Their munitions included both the mines and the bombs. The whole territory of Georgia was filled with various rocket emplacements and rocket caps. Millions of mines and bombs are scattered on the territory of Georgia. Storage facilities for bombs and mines are also left unprotected from rain, sun and freeze, that course ecological threat on environment. Explosives obviously are dangerous to population; in addition to above mention, their degradable wastes are toxic for environment.

Rocket solid fuels (RCT-4K, PCH 12, Balistite – 2 –fuels weight in each rocket is 20-500 kg) are more dangerous and harmful than explosives. Rocket fuel amount only on the territory of Georgia is more than thousands of tones.

Storage facilities for above mentioned rocket solid fuels are located near Tbilisi (Phonichala, Dedoplistskaro) as well as in Guria, Imereti and etc. Rocket solid fuel is dangerous and toxic without degradation. Decomposition of fuels without security measures causes environment pollution; living and farming were impossible on these territories for years. It is necessary to study situation and elaborate special technology for utilization of these wastes.

There are, also a lot of less dangerous, but perilous and explosive, old and useless gun powder. Their titles are shown below:

Pyroxylin gun powder,	12/1
	017/32
	4/1
HDT-3	19/1
	23/1

The amount of gunpowder is hundred thousands of kilograms on the territory of Georgia. According to chemical investigation and exact quantity determination elaboration of technology of gunpowder treatment into industrial explosives will become possible.

Problem of environmental pollution from these wastes is urgent for post Soviet Republics.

The preliminary consent from two international collaborators is received. These persons are:

1) Dr. Adam S Cumming
DStI/ UK MOD

UK MOD Capability Advisor on Energetic Materials and their Applications
Lead for UK on International Research Collaboration for Energetic Technology

Phone: + 44 1959 892170

Fax: + 44 1959 892480

E-mail: ascummind@compuserve.com; ascumming@dstl.gov.uk

2) Hiltmar Schubert

Fraunhofer Institut Chemische Technologie

Pfinztal (Berghausen), Berghausen 76327, Germany

Phone: (+49.721) 4640412

Fax: (+49.721) 464012811

E-mail: hiltmar.schubert@ict.fraunhofer.de

- **Summary of potential research project envisaged hosting of European researcher for the period of between 1 and 2 years**

Preparation and Application of Sex-Pheromones for Monitoring of the Principal Agricultural Pests in Georgia

Modern agriculture cannot exist without efficient means of plant protection, without means of struggle against pests, diseases and weeds. These preparations provide high and stable harvest. Due to soil-climatic peculiarities of Georgia in the struggle against pests insecticides are mainly used, then follow fungicides, in contrast to the practice applied in the world, where herbicides are predominantly used as means of struggle against weeds.

Rational application of modern costly highly efficient preparations is impossible without regulation of preliminary assessment (monitoring) of harmful organisms. A few days delay from optimal terms for spraying may result in rather impotent losses. In this respect **pheromone monitoring** is irreplaceable. This method has been applied in developed countries for four decades already without any adverse effect. Thus, in the first place, it is necessary to organize pheromone monitoring in Georgia, and there technical resources for it here. Pheromones condition inter-species communications and behaviour of insects. Pheromones show high selectivity and enable us to reduce drastically frequency of application of chemical means and its dose, to decrease significantly ecological injury incurred to environment. But it should be stated that no resistance is developed against these preparations and for years its efficiently does not fade.

The pests mostly distributed in agriculture of the countries in the basin of the Black and the Caspian Seas are Lepidoptera pests: **Grapholitha molesta Busck**, **Grapholitha funebrana** and **Laspegresia pomonella** as well as **Lobesia botrana**. Their sex-pheromones are long chain mono- and dienes. We have experience of their obtaining in laboratory conditions. Therefore it is necessary to elaborate technological schemes, technological regulations for organizing trial plant for pheromone sex-attractant for pests

If we achieve project goal we will manage to organize production of ecologically less hazardous sex pheromone preparations for the struggle against the most dangerous pests of agriculture of Georgia.

	Contact Information
* Contact person (first name, family name)	Nanuli Dolaberidze
* Department / Laboratory	IPOC, Laboratory of Physical Chemical Processes Researches
* Position	Main Ressearch Worker
* Qualification and research experience	Doctor of Chemical Sciences
* Post address (house, street, city, code, country)	0186, 5 Jikia str., Tbilisi, Georgia
* Telephone (+ country & city codes)	(+995-99) 93 15 23
* Fax (+ country & city codes)	
* E-mail	n_dolaberidze@yahoo.com

*** Summary of potential research project envisaged hosting of European researcher for the period of between 1 and 2 years**

Chemical Preparation of Nano-Sized Zeolite Materials

Nowdays micronized natural zeolite clinoptilolite is widely used in medicine due to assumption of its molecular-sieve properties and catalytic or inhibitoral activity towards several enzymes. Biological action of zeolite is strongly dependent on the area of its active surface, so it is necessary to use highly dispersed samples. Today preparation of micronized zeolite materials (particle diameter of 100 nm and smaller) is reached by tribomechanical treatment of natural clinoptilolite, but such method is characterized by several demerits. The aim of our project is to develop alternative methods for preparation of highly dispersed zeolite materials consisting from nano-sized particles, particularly – methods based on chemical treatment of natural zeolites. Preparation of nano-sized zeolite materials is proposed by re-crystallization of natural zeolites (task 1), as well as by their direct chemical treatment (task 2); optimal conditions of re-crystallization and direct treatment will be determined for two natural zeolites, clinoptilolite and phillipsite. The technique of hydrothermal re-crystallization will be applied as well as complex approach to direct treatment, including acid, ion exchange, and thermal treatment methods. Characterization of intermediate and target products will be carried out by chemical analysis, X-ray, IR-spectra, thermal analysis,

etc. methods, under technical support of the Petre Melikishvili Institute of Physical and Organic Chemistry.

The aim of third task of the project is to create the basis for business-plan of medical application of new materials, nano-sized zeolites prepared by chemical methods, including collection of marketing information, assessment of production costs both for pilot and large-scale technologies, as well as analysis of environmental aspects of production and application of new zeolite products.

Solution of mentioned problems in complex will serve for practical production and application of new medical remedies on the basis of Georgian natural zeolites. Methods to prepare nano-sized zeolite crystals from natural zeolites by re-crystallization or by direct chemical modification will be obtainable as a result of implementation of the Project, as well as new information about processes of crystallization and properties of materials. New methods giving possibility to extend the assortment of medical preparations are of commercial significance, as well as new materials, much more pure by zeolite phase content and fractional composition in comparison with mechanically micronized natural zeolites.

	Please, confirm your agreement on data publication and dissemination
I agree with the publication of the data on the web-site http://www.inco-ecca.net , and dissemination among Mobility National Contact Points of the EU MS and AC (YES / NO)	YES
Date	8.12.08