EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

INVESTING IN YOUR FUTURE!

GOVERNMENT OF ROMANIA

GOVERNMENT OF BULGARIA

D-EMERSYS

Rapid intervention force to chemical, biological, radiological and nuclear emergencies on the Danube River

Project Code : 15.3.1.052, e-MS code ROBG - 123

BROCHURE

ROMANIA - BULGARIA

Interreg

EUROPEAN UNION

www.interregrobg.eu

Project "D-EMERSYS - Rapid intervention force to chemical, biological, radiological and nuclear emergencies on the Danube River" is cofinanted by the European Union through European Regional Development Fund under the Interreg V-A Romania-Bulgaria Programme.


ROMANIA
SERBIA
BULGARIA
MEHEDINTI
DOLJ
OLT
TELEORMAN
GIURGIU
CALARASI
CONSTANTA
SILISTRA
DOBRICH
RUSE
VIDIN
MONTANA
VRATSA
PLEVEN
VELIKO TARNOVO
2000
1500
1000
500
200
100
0
0
50
100
200 km

INTERREG V-A Romania-Bulgaria Programme

D-EMERSYS

Rapid intervention force to chemical, biological, radiological and nuclear emergencies on the Danube River

Priority axis no. 3: A safe region
Specific objective 3.1: To improve joint risk management in the cross-border area

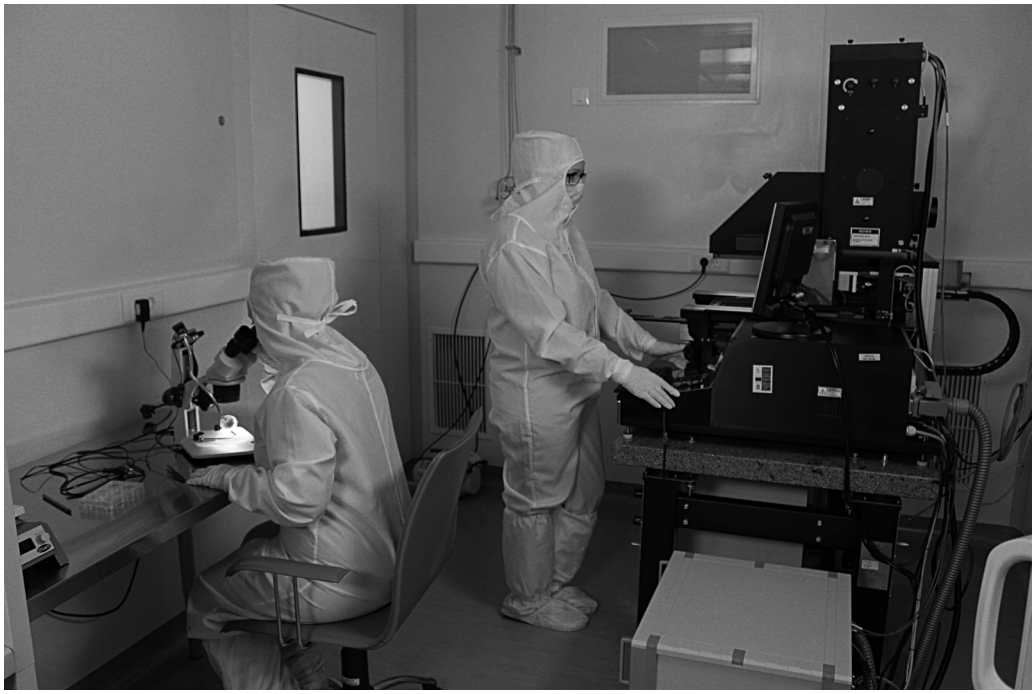
Project summary

To rapidly and efficiently manage the chemical-biological-nuclear emergencies (CBRN) on the Danube river, the Romanian-Bulgarian emergency authorities are setting up in the cross-border area a joint intervention rapid force, D-EMERSYS, resulting from inter-connection of 2 specialized units, the on-the water reaction unit provided to Romanian emergency authorities and the on-the land support unit provided to Bulgarian emergency authorities.

Both units will act coordinated under the command of the authority from the country where the intervention is taking place.

The core of on-the-water reaction unit are 3 rapid CBRN intervention boats equipped with capabilities for in-situ detection of contaminants and devices for decontamination of floating structures and fire-extinguishing/contaminant cloud dispersal. The land-based unit comprises 5 specialized mobile CBRN platforms provided with capabilities for analyses of CBRN toxic elements from water, soil and air, as well as with devices for decontamination of both intervention personnel and technique. Further specialized analyses of contaminants will be performed by a new “environmental forensic” laboratory set-up by NIMP.

The project will also deliver the training for intervention personnel and will prepare the tools required by the legal framework for the operationalization of D-EMERSYS, establishing a strong partnership on Danube river CBRN emergency response, for the benefit of population and environment.



Common territorial challenges

Contamination with chemical, biological, or nuclear materials of Danube can cripple transportation and economic systems and, if not contained, can have an irreversible impact on environment and inhabitants. The presence of industrial & nuclear facilities along Danube and the river-transport increase for hazardous materials challenge the emergency authorities from Romania–Bulgaria cross-border area. The frequency of emergency situations requiring specialised CBRN intervention has increased in the last 5 years, commiting authorities from both sides of the border to build-up the resources necessary to cope with on-the-river response for life-saving and assets and environmental safeguarding.

Responding in a quick and appropriate way to emergencies ranging from oil spills to burning barges with haz-mat cargos, requires specialized training, equipment, and protective gear to safely enter contaminated areas or hot zones. The intervention forces are responsible to rapidly identify and characterize the emergency, while performing rescues in the contaminated areas and confinement of contamination, simultaneously with technical decontamination. Thus, an effective intervention requires use of both specialized on-the-water capabilities and land-based units.

The added-value of this project, resides in creating a single intervention force at the disposal of authorities from the cross-border area, merging capabilities from both sides of the border in an economically efficient solution.

Main project objective

To create within the structure of emergency authorities from the cross-border area, a joint rapid intervention force to CBRN emergencies on the Danube River.
Relying on unification of efforts and coordination of resources, the project is a real, cross-border, joint action of authorities, meant to address a short-come of the emergency system from the cross-border area, with respect to its reaction and recovery capacity in case of CBRN emergencies on the Danube river.

Expected results

The project will create a highly specialized cross-border structure and will put in place tools and expertise that will provide for rapid and comprehensive management of CBRN emergencies, on the Danube river. The project will provide emergency authorities with state-of-the art technical means for detection and characterization and containment of contaminants, along with rescue facilities, so the quality of response and recovery on the Danube will be enhanced:

- on-water intervention unit - 3 rapid, fully equipped CBRN boats and 40 trained operational personnel (for Romanian GIES)
- on-land support unit - 5 fully equipped specialized CBRN mobile platforms and 160 trained operational personnel (for Bulgarian DG FSCP-MoI)
- multi-analyses SEM equipment for NIMPS's regional environmental forensic laboratory, RENFLAB.
- partnership and protocols for operationalization.

Rapid CBRN boat

The boat has very different technical capabilities compared to common sailing boats. The CBRN boat should be able to climb when needed on the stones of the river shore, without being damaged. Due to its special construction material and shape as well as to the accessories included in the configuration, the boat can operate even when in winter when ice start to form.

The boat is equipped with dedicated equipment for chemical-biological-radioactive materials detection and safety equipment and with an on-board cabin for crew transport and accommodation.

Apart from CBRN equipment the boat is equipt with an innovative system for material cutting and firefighting , dedicated to complex intervention on water (ships, barges) but also on shores (warehoused, harbors).

CBRN equipped containers

The CBRN container is a local intervention module, rapidly deployable to the site of a CBRN event. It is a compact field laboratory that contains all necessary capabilities to address all type of situations that may occur during a CBRN intervention, in terms of detection of chemical-biological-radioactive materials on site and also containment of pollutants with specific absorbent barriers.

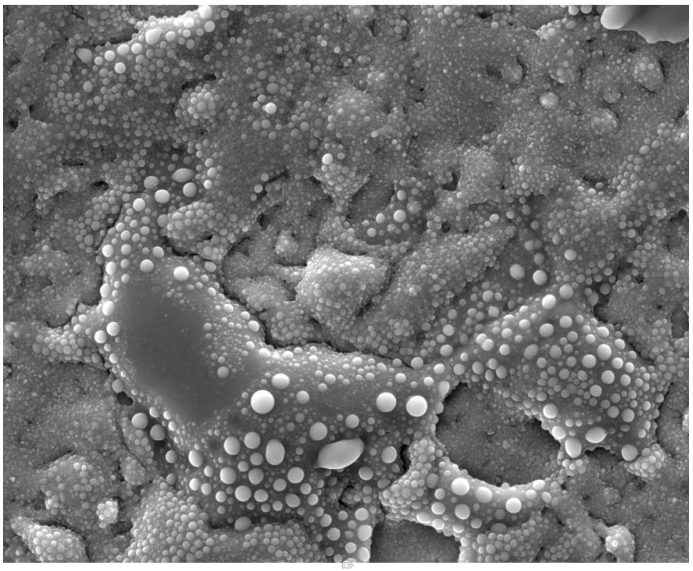
Specialized mobile CBRN platform

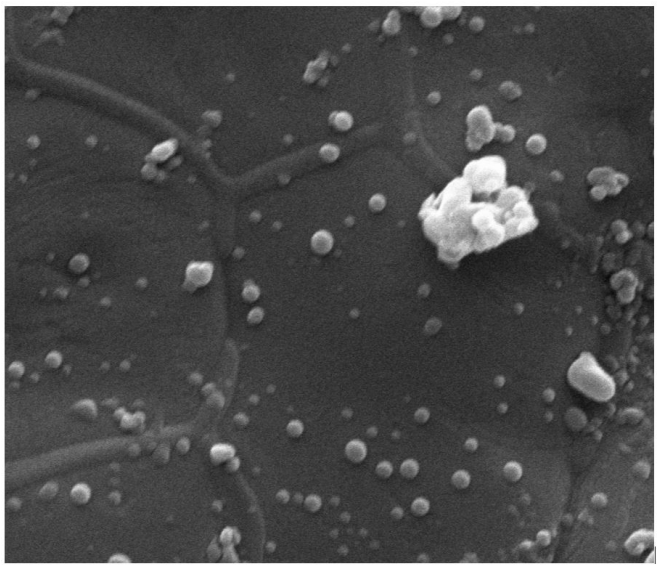
Specialized mobile CBRN platforms are power machinery that will provide for fast deployment of CBRN equipped containers to the emergency site. Tier 1 and Tier2 platforms will ensure access of intervention teams in any weather conditions and even through inaccessible terrain. The Tier 1 platform will be mid-range M (7.5-14 T) , category 2 vehicle. The Tier 2 platform will be a heavy-duty, off road tracked carrier with payload of about 7T.

High resolution SE-EBS-EDX microscope

A scanning electron microscope will be purchased and become part of the new laboratory dedicated to environment forensics. The tool will complement the existing capabilities of the host institution ensuring the capabilities to analyze a multitude of samples of various nature. It will offer the capability of determining the morphology of various samples at microscopic level (resolution at nanometer level) with ease and in a very short time.

An energy dispersive X ray microanalysis accessory will be employed to determine the elemental composition of samples. Practically the instrument will allow further addition of accessories, modern scanning electron microscopes being the swiss army knife of modern laboratories. As an example, some nanoparticles tend to be considered threats to human health or environment safety and a scanning electron microscope will be the fastest way to determine simultaneously parameters such as size, shape and composition of such nanostructures.





Project partners and beneficiary

Romanian partners

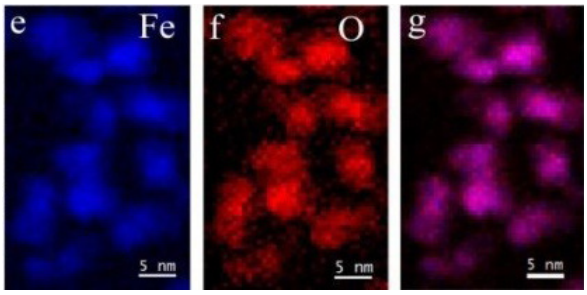
NATIONAL RESEARCH-DEVELOPMENT INSTITUTE FOR MATERIALS PHYSICS – NIMP

The National Institute of Materials Physics is the largest institute in Romania devoted to research and development in the field of solid state physics and materials. NIMP develops as a Center of excellence for research and high-level education (PhD, MSc, training courses) and provides a frame for interdisciplinary research in materials science. The research area covers Solid state physics (basic research) and Nanostructures and functional materials for energy applications, for information technology applications and for medicine and environmental protection applications. NIMP benefits from a brand new research infrastructure acquired in the last 5-7 years with state of the art equipment for materials synthesis and processing, structural, optical and physical properties characterization, with a strong emphasis on surface and interface science. The institute management develops a balanced policy of basic and application-oriented research.

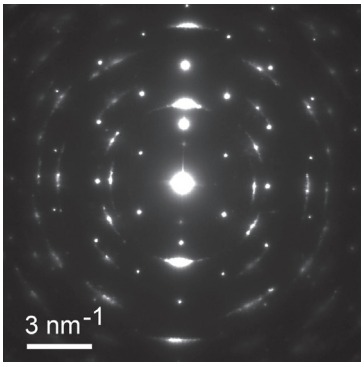
At only 65 km to Romania-Bulgaria border, NIMP is both the closest and largest research infrastructure for materials investigation. With highly qualified researchers and skilled specialized technicians, NIMP also benefits from a new research infrastructure acquired in the last years, having best in the region scientific equipment for structural, optical and physical properties characterization of materials and a certified laboratory for Chemical Analysis of Advanced Materials. NIMP is now developing the RITecC new center (~3500 m^2 of laboratory space) dedicated to applications, already including about 2 M€ equipment for analysis of environment relevant materials (like XPS, GC-MS, HRTEM+electron tomography) which matches many of the present project needs.

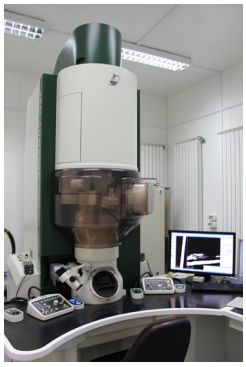
Structural, morphological and compositional analyses in NIMP

High resolution (down to atomically scale) transmission electron microscope (TEM)



Morphology, crystalline structure and elemental maps of specimens





Electron Spin Resonance

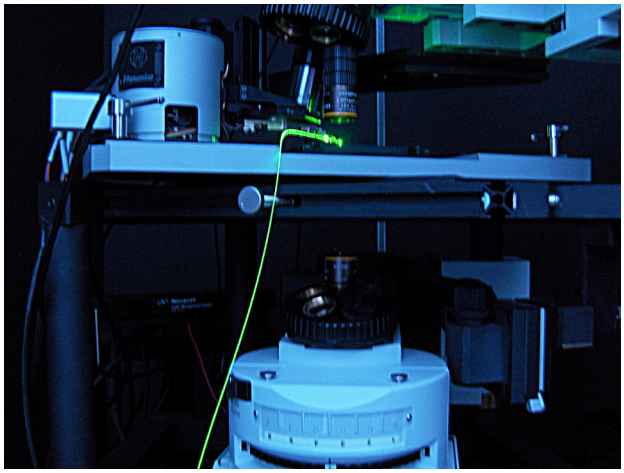
Impurities analyses

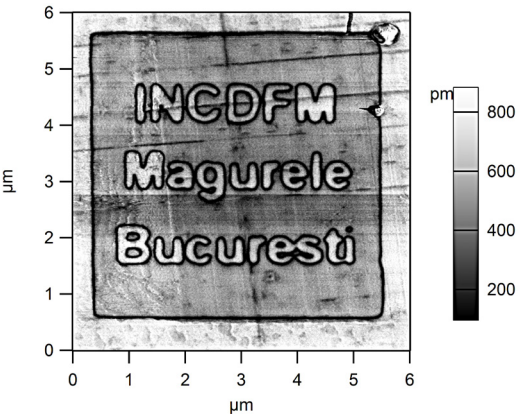
Controlled simulations of toxically and explosive gases using a Mixing Gases Station

X-Ray Photoelectron Spectroscopy

Surface analyses able to identify atomic species and chemical bonding

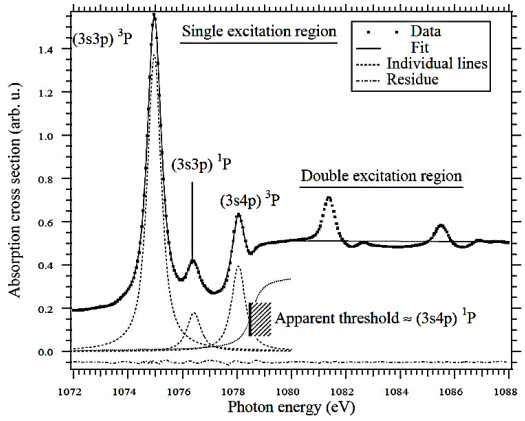
3D Surface analyses by atomic force microscopy (AFM)





Surface topography

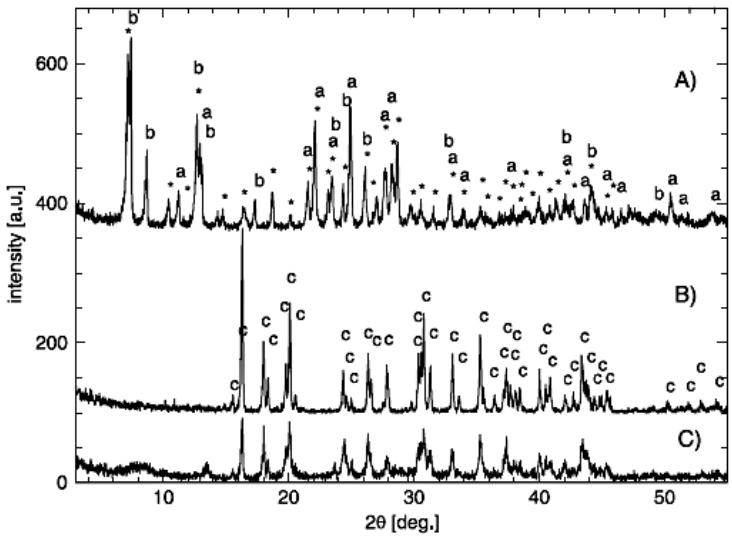
X-Ray absorption spectroscopy (EXAFS)



Local structure with atomic selectivity

Gas chromatography and mass spectrometry

X Ray diffraction on powders, thin films and bulk materials

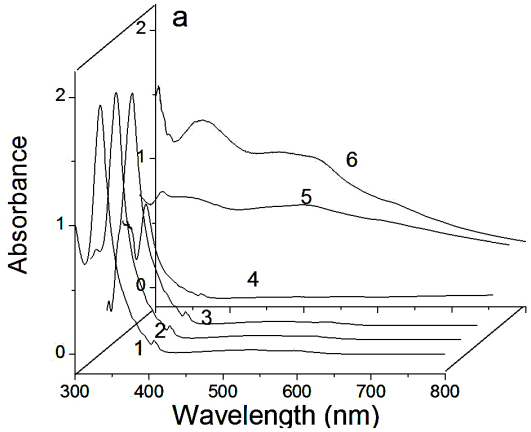


Crystalline structure of samples

Optical characterization of materials

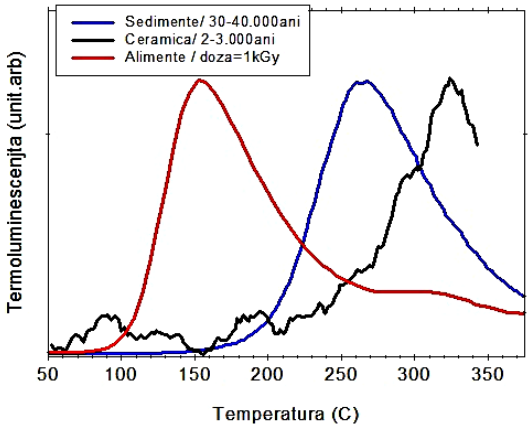
Getting materials fingerprints

UV-Vis-NIR Absorption spectroscopy on solid and liquid materials



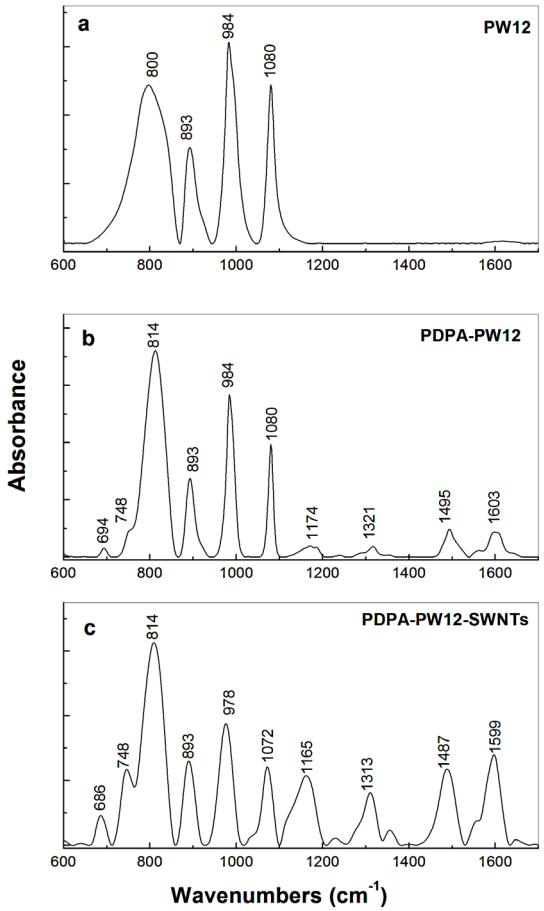
Chemical and structural analyses

Thermoluminescence analyses



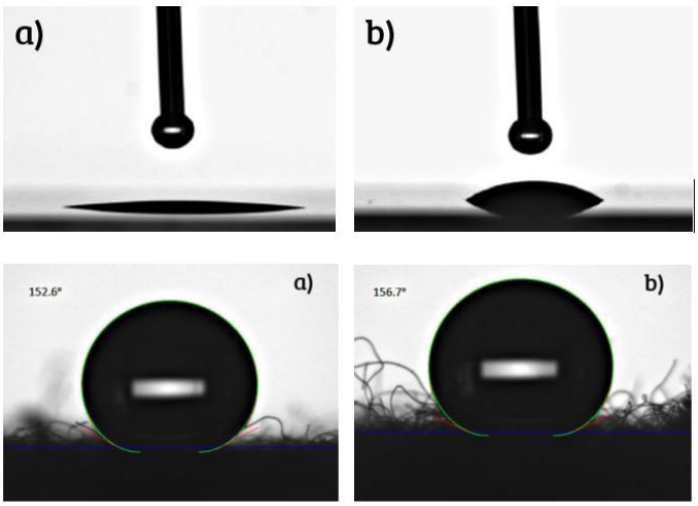
Materials hystory: age, irradiation hystory, retrospective dozimetry

Infrared absorption spectroscopy



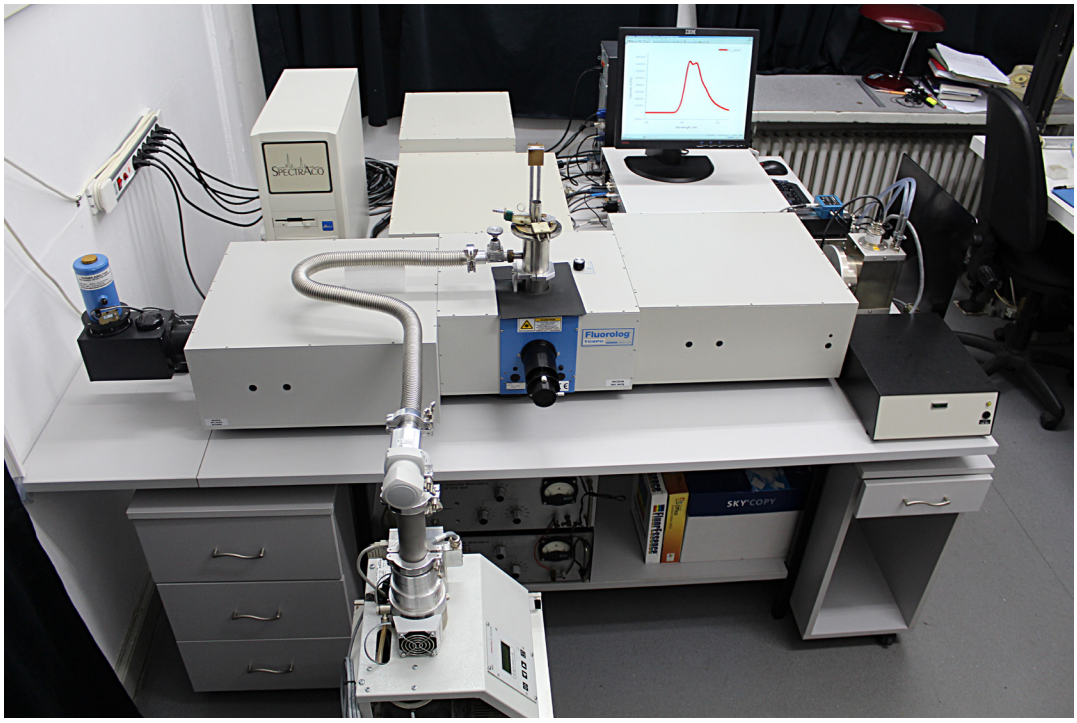
Specimen/sample fingerprint

Contact angle measurements



Surface tension, wettability

Photoluminescence spectroscopy



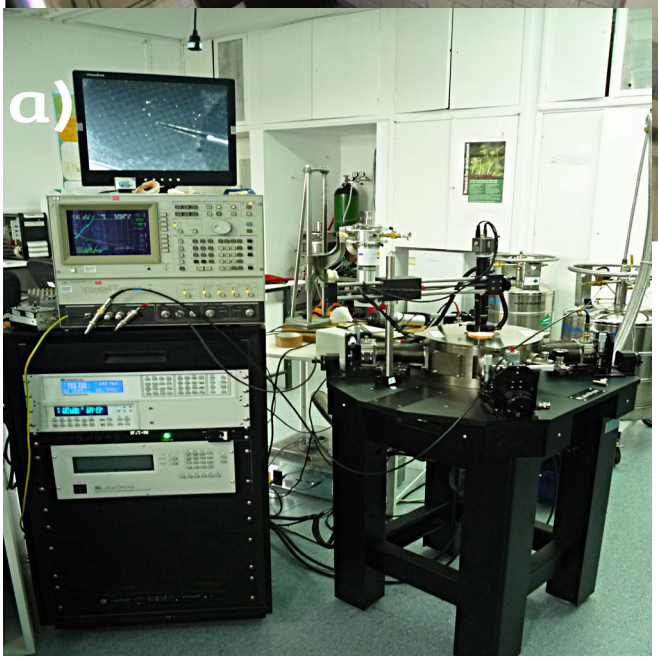
Electronic structure of materials

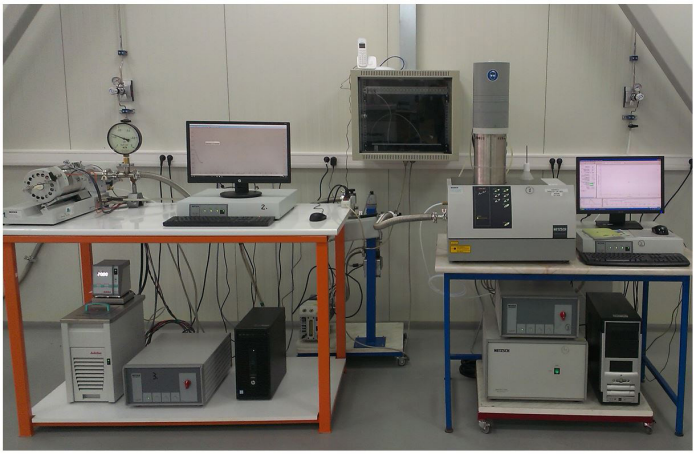
Raman spectroscopy

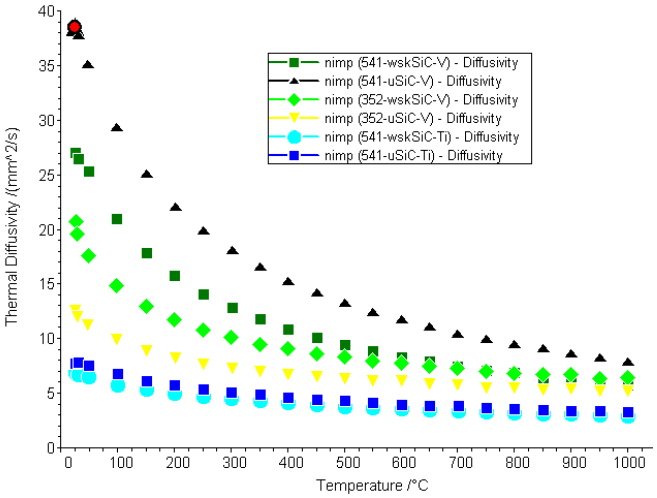
Chemical composition and molecular structure

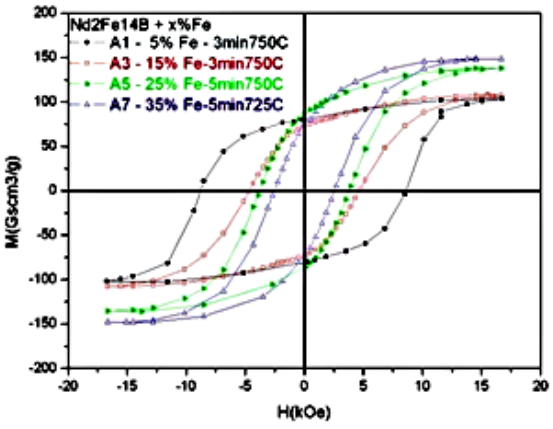
Thermophysical analyses

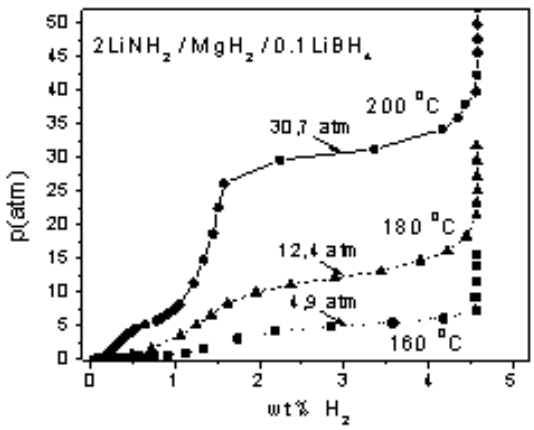
Materials behaviour in a wide range of environmental parameters: temperature (from -270 ºC up to 1600 ºC), pressure (from 10-3 Pa up to 1 GPa), magnetic fields (up to 14 T). NIMP is also the unique research institute in Romania having Mössbauer spectroscopy facilities.






nimp (541-wskSiC-V) - Diffusivity
nimp (541-uSiC-V) - Diffusivity
nimp (352-wskSiC-V) - Diffusivity
nimp (352-uSiC-V) - Diffusivity
nimp (541-wskSiC-Ti) - Diffusivity
nimp (541-uSiC-Ti) - Diffusivity
Thermal Diffusivity /(mm^2/s)
Temperature /°C


Nd2Fe14B + x%Fe
A1 - 5% Fe - 3min750C
A3 - 15% Fe-3min750C
A5 - 25% Fe-5min750C
A7 - 35% Fe-5min725C
M(Gscm3/g)
H(kOe)


2LiNH2 / MgH2 / 0.1 LiBH4
200 °C
30,7 atm
180 °C
12,4 atm
4,9 atm
160 °C
p(atm.)
wt% H2

AN OVERVIEW OF THE GENERAL INSPECTORATE FOR EMERGENCY SITUATIONS - ROMANIA

Until 2004, civil protection and firefighting measures were made by the General Inspectorate of Military Firefighters and Civil Protection Commandment, institutions under the coordination of the Ministry of Interior.To accommodate to the exponential growth of non-military risks because of the accelerating trends of globalization, radical climate changes, diversification of economic activities and response to disasters, the two institutions mentioned above, merged in December 2004, therefore taking birth the General Inspectorate for Emergency Situations (IGSU).

The General Inspectorate is part of the National System of Emergency Situations Management (SNMSU), hereinafter referred to as National System, and it's a part of the protective forces of the Security and National Defense System. The general organization of SNMSU:

- Committees for Emergency Situations;
- General Inspectorate for Emergency Situations;
- Professional and volunteer Services for Emergency Situations
- Operative Centers and coordination and command centre for emergency;
- Action Commander;

Also at national level, the General Inspectorate is coordinating institutions participating in the emergency situations management, in accordance with the existing principles at the international level, specific to U.N., E.U., N.A.T.O., and other bodies to which Romania is part of.

As part of the National Management System, IGSU coordinates, at national level, the state bodies with responsibilities in management of emergency situations. It ensures nationwide unitary implementation of the legislation in force regarding the protection of life, property and environment against fires and disasters, as well the accomplishment of civil protection and emergency management measures.

In Romania, by law, IGSU is the national regulatory authority in the field of civil protection. Its main relevant thematic competences with nationwide applicability include:

- Issuing of methodologies, regulations, instructions, operational standards and procedures in the field of planning, preparedness for and emergency response;
- Issuing and coordinating the implementation of national programs for training in the field of protection against disasters/emergency situations;
- Ensuring and developing the international cooperation in the field of emergency management and response;
- Coordinating and conducting professional emergency services (county inspectorates for emergency situations) in the field of planning, preparedness for and emergency response.

IGSU is the national specialized structure of the Ministry of Interior for ensuring fire safety, rescue and protection in case of disasters. IGSU is structured into a central level administration and at regional level there are 41operational structures called county inspectorates for emergency (ISUJ). ISUJ have responsibilities for fire extinguishing; rescue activities; emergency rescue and recovery activities, operative protection in case of floods and search and rescue operations; early warning and alert in case of disasters.

ISUJ are a specialized structure with legal personality, part of local subsystem for emergency management, designed to execute missions of prevention, monitoring and managing emergency situations in its area of competence, which usually coincides with county's territory. The main responsibilities are planning, preparedness for and emergency response, based on regulations issued by IGSU. ISUJ are organized and functioning as professional service for emergency situations subordinated to IGSU.

In the county inspectorates for emergency also works Emergency Medical Service for Resuscitation and Extrication (SMURD), in cooperation with county hospitals, regional and local authorities. SMURD structure works in integrated teams of extrication, reanimation, specialized technical assistance as well as emergency medical and paramedical staff teams specialized in first aid qualified.

Within the General Inspectorate are established and functioning as specialized structures in the areas of competence:

- The National Operational Centre, which fulfills permanently the functions of monitoring, evaluation, notification, warning, early-warning, alarming, alerting, coordination and operational management of emergencies situations at national level;
- The Prevention Inspection, which fulfills the functions of regulation, approval, guidance, public information and control;
- The Logistical management structure that organizes, controls and performs specific measures of technical and material supply, property management and other tasks necessary to carry out the attributions;
- The Financial accounting structure, which ensures the management of public funds, related to the General Inspectorate;
- Other compartments appropriate to fulfill specific missions.

The General Inspectorate is organized in departments, services, offices and / or compartments. General Inspectorate and county structures are made up of 41 operational centers and 280 operative sub-units with over 3,500 technical means of intervention.

The institution has nearly 30.000 employees working 97% in operational units and 3% in administrative structures: schools, studies and research bases, workshops and technical supply depots, logistics and repair.

The staff is assured by dedicated training institutions: Police Academy “Alexandru Ioan Cuza” Bucharest –Fire Officers Faculty and “Pavel Zăgănescu” Non-Commissioned Officers School for Firefighters and Civil Protection Boldeşti.

Bulgarian partners

DIRECTORATE-GENERAL FIRE SAFETY AND CIVILPROTECTION MINISTRY OF THE INTERIOR, BULGARIA

The Directorate-General Fire Safety and Civil Protection is a part of the Ministry of the Interior of the Republic of Bulgaria (DG FSCP – MoI). The DG FSCP is structured into a central level administration and at regional level, there are 28 territorial structures established and functioning in each geographic region (district) of the country. The Fire Directorate-General Safety and Civil Protection is a national specialized structure responsible for fire safety, rescue and protection in case of disasters.

Implements:

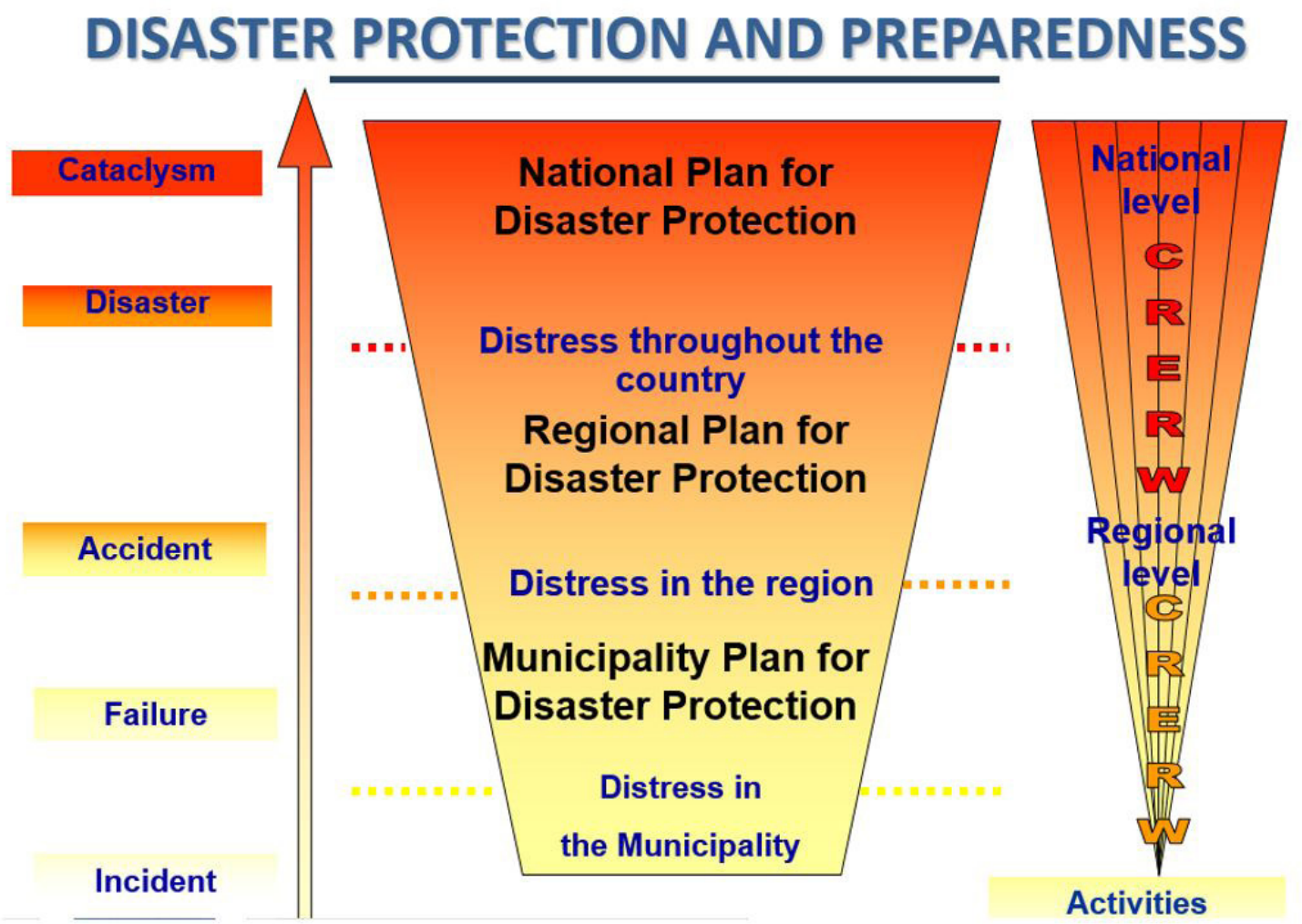
- Prevention and control; fire extinguishing and state fire control, rescue activities;
- Authorization and control activities of traders operating in fire safety in premises and / or operation of facilities and equipment related to fire safety;
- Authorization and control activity of products for fire extinguishing in regards to their effectiveness;
- Emergency rescue and recovery activities, operational protection in case of floods and search and rescue operations;
- CBRN protection in case of incidents and accidents with dangerous substances and materials and mitigation of ecological incidents;
- Early warning and announcement in case of disasters and aerial danger of the executive authorities and the population;
- Protection of the population in case of “wartime” or “emergency situation” in compliance with the Geneva Conventions;
- Assistance in the activities of the Interagency Commission for recovery and relief to the Council of Ministers;
- Methodical and expert support for disaster protection to the territorial executive authorities;
- Operational cooperation with the EU and NATO structures and other international organizations in the field of fire safety and protection of the population, humanitarian aid and civil-military emergency planning.

EMERGENCY MANAGEMENT

INTEGRATED RESCUE SYSTEM

Main part of prevention is the adequate emergency planning – DG FSCP elaborates National disaster protection plan, which includes plans in case of:

- Fires;
- Floods;
- Earthquakes;
- Winter storms and ice sliding;
- Oil products spill;
- Industrial incidents;
- Radiological incidents;
- Biological contamination;
- Terrorist acts.



ROLE IN THE PROJECT

DG FSCP has a wide range of specialised administrative units and departments covering all aspects of disaster management – their experts would contribute with knowledge and experience to the project activities.

DG FSCP will actively participate in the promotion and dissemination of the project results. DG FSCP has a tradition in working with different stakeholders (NGOs, volunteers, municipalities, schools and academia) with the aim of conducting public events for population awareness raising in the field of fire safety and civil protection.

National Research-Development Institute for Materials Physics – NIMP
Address: 405A Atomistilor Street, Magurele, Ilfov, Post Code 077125, ROMANIA
Phone: +(4021) 241.81.00
Fax: +(4021) 369.01.77
Website: www.infim.ro

Project title: "D-EMERSYS - Rapid intervention force to chemical, biological, radiological and nuclear emergencies on the Danube River"

Project Code : 15.3.1.052, e-MS code ROBG - 123

Editor of the material: National Research-Development Institute for Materials Physics – NIMP

Date of publishing: April 2017

Project "D-EMERSYS - Rapid intervention force to chemical, biological, radiological and nuclear emergencies on the Danube River" is cofinanted by the European Union through European Regional Development Fund under the Interreg V-A Romania-Bulgaria Programme.