mold ERA

Newsletter

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www.mold-era.eu

Prof. Ion Tiginyanu (Project Manager)

MOLD-ERA – the first FP7 project coordinated by the Republic of Moldova

MOLD-ERA is the first FP7 project where the Republic of Moldova is Coordinator, being represented by the Institute of Electronic Engineering and Nanotechnologies (IEEN). The objective of MOLD-ERA is to assist IEEN to develop and implement a research strategy that will expand its activities and increase its level of excellence and visibility, so that it can compete and collaborate with leading research institutions in Europe.

MOLD-ERA aims to create a technological infrastructure, to organize training courses in nanobiotechnology and in preparation of projects for FP7, to implement a high-tech culture in the society and to integrate the scientific community of Moldova into the European Research Area by developing close collaboration and networking with excellent European research centres and industrial companies.

The project focuses on a new research and training program for young researchers that will result in building of capacities at the intersection of fields related to nanotechnologies and biomedical engineering. MOLD-ERA training activities will be opened up and integrate with activities in other relevant research institutions in Moldova to increase the project impact.

Project activities including practical courses will be organised jointly with partners from Germany and the United Kingdom, in the fields of biocompatibility of electronic and photonic materials, transformation of biosignals in electric signals and vice-versa, extra and intracellular bioelectric signalling, biotoxicity and related disciplines. The courses will be delivered during 2 summer schools organised within the project, as well as courses for researchers from IEEN, Technical University of Moldova, University of Medicine and Pharmacy and other research and education institutions.

For more information about MOLD-ERA's first Summer school on Nano-Bioengineering organised on July 3-7, 2011 please visit www.mold-era/summerschool2011.

MOLD-ERA objectives are in line with the forthcoming association of the Republic of Moldova to the FP7 Programme and will contribute to its success.

On November 29, 2010 FP7 MOLD-ERA project was launched in Chisinau, Moldova, with a kick-off meeting in which representatives from all partner countries (Moldova, Israel, Germany, UK) participated. MOLD-ERA website was launched in December 2010 and is available at www.mold-era.eu

Plasma Etch System – extending research from Nanotechnology to Nanobiology

One of MOLD-ERA's objectives is to increase technological resources by purchasing and using new equipment to extend the research area from Nanotechnology to Nanobiology. A Plasma Etch System was the first acquisition of the MOLD-ERA project.

The Cylos 160 RIE for plasma treatment system is designed for plasma processing including surface activation, surface fine cleaning, reactive ion etching, and offers the possibility to upgrade the system for plasma enhanced chemical vapour deposition (PECVD). Argon and oxygen gases were selected for plasma operation because of their environment-friendly properties and application versatility.

The reactive ion etching process is required for semiconductor meso- and nanostructuring. Note that this technological step is one of the main processes in modern semiconductor technology. Plasma treatment is required to improve e.g. the wettability of hydrophobic substrates. These are usually polymers or dielectrics that find applications in bioengineered structures or microelectronic devices as passivation layers.

The acquired system possesses a user interface which allows control of parameters such as gas concentration thanks to mass flow controllers, radio frequency plasma power in the range up to 600 W and sequences of steps in automatic mode. The entire system operates under a small rotary vane vacuum pump requiring a minimal technical assistance.

The plasma system will be used for student training in the modification of properties of biocompatible materials as well as for research purposes. It will be an important component of the technological infrastructure of the Republic of Moldova.

News from NanoTechWeb.org

Nano-roof reveals dislocations – a new technology developed by researchers from IEEN and TUM

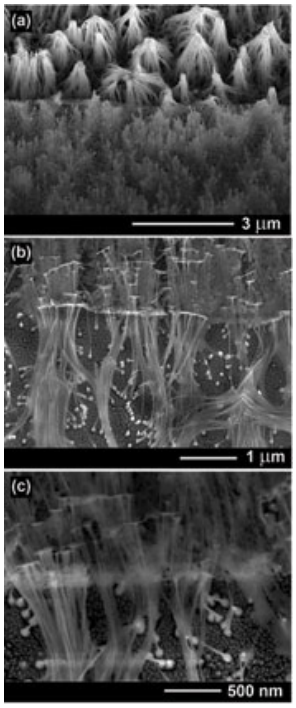
Researchers in Moldova have fabricated nanometre-thin membranes of gallium nitride for the first time and investigated their architecture using electron microscopy. GaN is a large-bandgap semiconductor widely used in electronic applications such as high-temperature, high-power electronics and optoelectronics for light-emitting diodes and lasers. GaN is also biocompatible, piezoelectric and resistant to ionizing radiation, while the nanostructured material could be good for making spintronics devices.

Dislocation networks, which form thanks to the mismatch between epitaxial layers and underlying substrates, are notoriously difficult to observe. They are a nuisance because they adversely affect the properties of electronic and optoelectronic materials and device structures. Professor Ion Tiginyanu and colleagues have now developed a new technique that involves etching away high-quality crystalline material from bulk GaN epilayers to leave behind only the dislocation networks and a thin film to which the dislocations remain attached. The resulting nanostructures can then be imaged using scanning electron microscopy.

Tiginyanu's team used a modified version of the surface charge lithography (SCL) technique recently developed in their lab. SCL works by pre-treating a semiconductor surface using a low-energy ion beam to induce trapped negative charges that then effectively shield the material against subsequent photoelectrochemical (PEC) etching. For example, low-fluence Ar ions with energies as low as 0.4 keV can be applied to the GaN surface to do just this. The material remains transparent to ultraviolet light, however, so it can still be deeply etched.

GaN nano-roof

Because threading dislocations survive PEC etching, thanks to their negative charge, etching in potassium hydroxide can then create an ultrathin film membrane of GaN that resembles a "nano-roof" to which the dislocations are attached. "It is rather like pumping water from a lake covered by a layer of ice that has algae fixed on the surface – the network of algae can then clearly be seen," explained Tiginyanu.



According to the SEM images, each dislocation has a "root" shaped like a nanoball that has pronounced features such as clustering along definite lines and loops. "The dislocations are clustered about their roots and top ends forming mosaic structures," said Tiginyanu. The researchers also found that the dislocation networks emit mainly yellow light, while the GaN nano-roof emits both UV and yellow. The prevailing yellow part is probably related to point defects trapping the negative charge that shields the material against PEC etching.

Making nanometre-thin GaN membranes transparent to both electrons and UV-light is spectacular, says Tiginyanu. "Our preliminary investigations show that, in spite of their small thickness, the GaN nanomembranes have good electrical conductivity," he told nanotechweb.org. "Our technique for fabricating such thin gallium nitride membranes could help us better explore two-dimensional GaN-based structures predicted to be ferromagnetic with defect-induced half-metallic configurations, particularly important for spintronics applications."

The results were published in Materials Letters.
Source: **http://nanotechweb.org/cws/article/tech/44967**

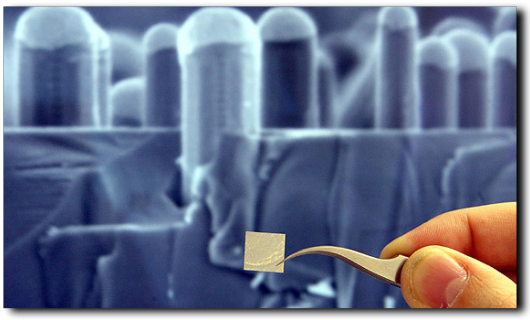
Project upcoming events

MOLD-ERA organises its first FP7 Training Workshop

Chisinau, Republic of Moldova

June 29 – July 6, 2011

The first round of training workshops on FP7 will be organised in Moldova in June and July 2011. The training will focus on proposal writing and will target a wide number of researchers and staff from research organisations, universities, SMEs and industrial companies. The aim of these workshops is to ensure a more efficient and practical understanding of FP7 rules and regulations and to increase success in submitting FP7 proposals.



Launch of World Class Summer School in Nano-Bioenginering in Moldova

Chisinau, Republic of Moldova

July 3-7, 2011

MOLD-ERA is organising its first Summer School in Nano-Bioenginering, biomaterials and biocompatibility.

It is a unique opportunity for junior researchers, MSc and PhD students to update their knowledge in these fields. Lectures will be presented by professors and researchers from consortium partners including Hannover Medical School (Germany), Center for Device Thermography and Reliability (Bristol, UK), Technical University of Moldova, University of Medicine and Pharmaceutics of Moldova and Institute of Electronic Engineering and Nanotechnologies of the Academy of Sciences of Moldova.

This Summer School targets PhD and MSc students, young researchers and students in their last year who study solid state physics and electronics, microelectronics and nanoelectronics, biomedical engineering, biology, medicine and related fields, coming from research organisations, universities, SMEs and industrial companies.

For more information on application procedure, please visit www.mold-era.eu/summerschool2011

MOLD-ERA partners

Institute of Electronic Engineering and Nanotechnologies, Republic of Moldova
www.iieti.asm.md

The Institute of Electronic Engineering and Nanotechnologies (IEEN) is a leading research institution of the Republic of Moldova in the fields of nanotechnologies and electronics for medicine. It is the editor of two scientific journals, namely Moldavian Journal of the Physical Sciences (in English) and Physics and Modern Technologies (in Romanian). The Institute collaborates closely with universities and research centres from Germany, UK, France, Poland, Romania, USA, Russia, Ukraine etc., and currently is involved in 5 international and 12 national projects.

Technical University of Moldova, Republic of Moldova
www.utm.md

The Technical University of Moldova is the only higher technical educational institution in the Republic of Moldova. At present, the University comprises 10 faculties, the teaching-didactic and engineering staff which adds up to over 1000 lecturers. The six research centres of TUM successfully apply into practice the University's research strategy, within numerous grants and research programmes.
The National Centre of Material Study and Testing (NCMST) within the Technical University of Moldova is a leading research centre in the fields of material science and nanotechnologies. The Centre's activity is focused on the development of novel nanomaterials and nanodevices for various applications, including electronics, photonics, plasmonics, bio-medicine etc. The centre plays a major role in education of a new generation of young specialists in materials science and nanotechnologies.
Its activity is closely related to the Department of Microelectronics and Semiconductor Devices of TUM.

EFP Consulting Ltd, Israel
www.efpconsulting.com

EFP Consulting staff have strong technical backgrounds and are involved in projects that train and assist the participation of organisations in the Framework Program. They have considerable Framework Program experience covering the technical, financial and project management aspects, and in particular are experienced in introducing the Framework Program to countries and organisations outside the older established Member States by advising and assisting on how best to become successfully involved. EFP Consulting coordinated the IST project Finance-NMS-IST which setup the Finance Helpdesk. They are partners in the Idealist7FP project responsible for Quality Management and are also key players in several ongoing and recent projects such as LOGSEC, BOOST-IT, EPISTEP, CEEC-IST-NET and EPIST.

Academy of Sciences of Moldova, Republic of Moldova
www.asm.md

The Academy of Sciences of Moldova (ASM) is authorised with the Government's competence in the RDI field. ASM collaborates on the basis of bilateral scientific agreements with various research institutions from all over the world, as well as develops relations with international organizations as ALLEA, NATO, BSEC, CEI, U.S. CRDF, STCU, COST and others. During FP6, and now in FP7, ASM acts as NCP hosting institution, thus having the responsibility for coordination and promotion of Moldovan participation in the Framework Programs, for a gradual integration into the European Research Area. ASM is presently involved in several FP7 projects.

University of Bristol, United Kingdom
www.bris.ac.uk

The University of Bristol has a declared commitment to excellence in teaching and learning within an environment of internationally recognised research. The University has become a major force in the region's knowledge economy and is a key player in Bristol being announced a „Science City" in the Chancellor's 2005 Budget statement.
The Applied Spectroscopy Group and Centre for Device Thermography and Reliability (CDTR) in Bristol is leading research on properties of semiconductor materials and devices on the mesoscopic and nano scale. This work has led to a number of successful collaborations with industrial and university partners and resulted in many scientific publications and conference contributions. Research in the CDTR is supported by grants from EC FP7, UK EPSRC, EC EDA, ONR Global, DARPA and others, also by various UK, German, French and US companies.

Medizinische Hochschule Hannover, Germany
www.mh-hannover.de

The Hannover Medical School (Medizinische Hochschule Hannover, MHH), founded in 1965, is one of the world's leading university medical centres. Due to its interdisciplinary research MHH has strong collaborative links with many academic and industrial research organizations worldwide.
MHH concentrates its research activities to unravel basic mechanisms which will be, in close collaboration with clinical facilities, translated into clinical research. The main research activities focus on Transplantation and Stem Cell Research, Infection Biology and Immunology as well as Biomedical Technology.
Research from the Department of Cardio-Thoracic, Transplantation and Vascular Surgery, Hannover Medical School has been awarded multiple prizes for achievements and innovations, thus representing one of the leading institutions in the field of cardiovascular tissue engineering and regeneration worldwide.