# <section-header><text>



# Dear Friends!

Rapid growth of the world's population and accelerated development of technologies are the two trends that affect the growth of natural resources operation and the resulting aggravation of adverse environmental effects.

For this very reason, science should place a critical priority on the development of technologies ensuring further progress accompanied by the minimization of environmental effects. We must preserve our planet with its natural diversity for our ancestors.

The highest possible environmental safety level is an essential prerequisite for any new new production business. This process is driven by chemical industry. For this very reason, we have combined our efforts with UNE-SCO and the International Union of Pure and Applied Chemistry (IUPAC) in support of young scientists working to create environmentally safe technologies.

I am certain that the Green Chemistry for Life will become successful project exemplifying combined efforts of science and industry in the shaping of new progress ethics, entailing high responsibility for the flourishing of future generations of the Earth. I want to express my enormous gratitude to the Ministry of Foreign Affairs of the Russian Federation and the Commission of the Russian Federation for UNESCO for their support for our initiative. I hope that our joint program with UNESCO and IUPAC will render effective support to young researchers and encourage scientific search towards Green Chemistry for Life.

Can chemistry be safe for nature and humans? Yes, it can. This is evidenced by Green Chemistry for Life, a joint project run by the Russian PhosAgro and UNESCO.

Continued on page 2

# Making the World a Cleaner and Safer Place

As Green as Grass

Based in Russia, PhosAgro is the largest European and one of the major global producers of phosphatebased fertilizers. On top of that, PhosAgro is a successful science and education philanthropy organization. The Company offers substantial assistance to the high school in Russia and supports environmental R&D projects on a global scale.

hosAgro leads the chemical industry charge not only in Russia, but globally. It is the planet's largest producer of high-grade phosphate rock with the P2O5 content of no less than 39%. A holding company with a flexible vertically integrated business model, PhosAgro supplies 28 grades of

mineral fertilizers to over 100 countries. Despite its young age (14 years in the market), the Company has earned respect and recognition in the international business circles. With a total mineral fertilizer and feed phosphate production capacity of 6.5 million tonnes, PhosAgro shipped over 1.6 million tonnes of mineral fertilizers to the Russian agribusinesses last year. Over the past three years, PhosAgro has been the leading supplier of mineral fertilizers in the Russian market accounting for 25% of the overall domestic fertilizer supply.

Continued on page 3

Yours respectfully, Andrei Guryev, CEO of PhosAgro

# Members of the Green Chemistry for Life contest jury:



## Prof. Maciej Nalecz, Director of the Division of Science Policy and Capacity Building (SC/PCB), Natural Sciences Sector, UNESCO

The overall objective of the project "Green Chemistry for Life" is to enhance global capacity to harness green chemistry for the protection of the environment and human health, to introduce new environmentally sound science-based

technologies, and to identify novel vistas for the use of natural resources and energy savings. To attain this objective the project is promoting the input of talented young scientists to research and innovations in green chemistry. The results of the project encompass the new scientific knowledge generated, innovative applications of scientific and technological findings launched, reinforced research capacities of the participating institutions, and finally yet importantly, the public at large sensitized to the opportunities offered by advances in green chemistry. In 2015, young scientists from 31 countries from all regions of the world submitted their proposals. These countries included Canada, Cyprus, France, Ireland, Italy, Portugal, Spain, Belarus, Bulgaria, Poland, Russia, Slovakia, Ukraine, Argentina, Brazil, Mexico, China, India, Indonesia, Iran, Korea (Republic of), Malaysia, Mongolia, Algeria, Burkina Faso, Cameroon, Egypt, Kenya, Nigeria, Senegal, and South Africa. We look forward to receiving many new applications for the third call: http://www.unesco.org/new/en/natural-sciences/science-technology/basic-sciences/chemistry/ green-chemistry-for-life/ The deadline for submission is 28 February 2016. All documents necessary for are available on this web-page.

In our view by funding this project PhosAgro demonstrates an exemplary sense of responsibility for environmental and societal implications of industrial activity and provides a promising model for the development of science/industry co-operation on the international arena.



#### Prof. John Corish, School of Chemistry, Trinity College, University of Dublin, Ireland

First of all this project rises awareness of green chemistry among younger scientists at most critical time in their career. Second, it advances the careers specifically of young green chemists. The hardest part of the career is to get started, to find somebody who

gives some research funding. It also helps them to form collaborations at an international level because it's where they meet the other young chemists from all over the world.

The program promotes the awareness of green chemistry in general, which is ultimately good for sustainable development, for humanity. In these two years, we have got around 240 applications from every region of the world, which is quite remarkable. We're in IUPAC run another program for more senior chemists and we get a lot less applications.



Many countries, especially the developing ones, urgently need to boost their scientific potential in green chemistry leveraging research to protect environment and implement environmentally friendly technologies. Our cooperation will be fine-tuned to the year long efforts of UNESCO in this area focusing on providing support to the younger generation of researchers and helping to address the existing challenges.

> Irina Bokova, UNESCO Director-General

# As Green as Grass

#### Continued. Beginning on page 1

he project emerged in 2011 at the official opening of the International Year of Chemistry held at UNESCO headquarters in Paris. During the event, PhosAgro's representatives proposed setting up a special fund to sponsor financial and research support for young talents developing advanced chemical technologies. The main condition for receiving the grant was the candidates' commitment to the resolution of the environmental, healthcare, food supply, energy efficiency and sustainability problems.

UNESCO pledged enthusiastic support for PhosAgro's initiative and, as early as in March 2013, the international organization and the Russian company signed a partnership agreement kicking off a meticulous search for young talents worldwide, whose unconventional ideas could benefit the common cause. A competent jury made up of globally renowned scientists was set up under the auspices of UNESCO and IUPAC (International Union of Pure and Applied Chemistry) to select applicants for the grants. The jury was overseen by a trilateral board, consisting of professor Maciej Nalecz, the jury Chair, Director of the UNESCO Division of Science Policy and Capacity Building; professor Nicole Moreau, member of the Executive Committee under the International Council for Science (ICSU); professor John Corish, IUPAC Treasurer, and Sergei Sereda, PhosAgro's First Deputy CEO. The first selection results were announced in May 2014. The jury reviewed over 100 applications from young researchers across the globe and picked up six research projects eligible for the grant. The grants were officially awarded at PhosAgro headquarters. In 2015, the history repeated itself. With the project coordinators looking

for bright young talents and the jury selecting the most ambitious applications, six promising researchers became eligible for financial support. All of the winning projects focus on innovation and have extensive pre-studies in place. For more details on the innovative projects and people behind them, see other articles in our newspaper.

# Green chemistry is a scientific concept designed to make chemical production and products perfectly safe for humans and the environment.

Green Chemistry for Life is a five-year project. Over this period, PhosAgro will allocate a total of



What can I say about a typical researcher? They are young, less than 35. I've noticed they are extremely well-qualified people and a lot of them came from the very best institutions in green chemistry.

We choose the winners using three criteria. The first one is the scientific excellence. We look how they are adhere to the 12 principles of the green chemistry. Then we look at the researcher's publications. Some of them are quite young and they have a quite a remarkable amount of works. Then we look at the novelty of the research and we make sure they have facilities to do a good job. Afterwards we look at possible practical applications of the project.

I've been impressed by projects really trying to solve real local problems and the other ones that take locally produced products trying to add the value on them.

This program is "a marriage made in heaven". The three institutions very well match. PhosAgro very generously provides the money. UNESCO has tremendous contacts around the world and IUPAC where I work provides the scientific expertise. to support young researchers' green chemistry projects. In the long history of the UNESCO and, more generally, the United Nations, this is the first initiative to be delivered on an extrabudgetary basis and funded by a Russian company.







Dear sponsors of the Green Chemistry for Life, members of the international scientific jury and contest honorees! I am delighted to welcome you here, in Saint Petersburg, at the second awards ceremony staged to honor the winners of the contest among young Green Chemistry for Life researchers. Launched by UNESCO, the International Union of Pure and Applied Chemistry (IUPAC) and the Russian company PhosAgro, the project seeks to deliver on the sustainable development goals. It is little secret that environmental issues have moved on to take the center stage among the global community's key values. Today, we are becoming increasingly aware that the destruction of nature and irreversible climate changes are too high a price to pay for progress. The project seeking to support researchers committed to the development of new environmental impact minimisation technologies has emerged as an important element in the long row of measures and efforts undertaken by the international community to preserve our planet's nature.

I would therefore like to take this opportunity to wish you further success in the implementation of the Green Chemistry for Life program and say that we are looking forward to even more promising new projects in the future.

> Grigory Ordzhonikidze, Secretary-General of the Russian Commission for UNESCO

# Making the World a Cleaner and Safer Place

## Continued. Beginning on page 1

## **Contributing to the Future**

PhosAgro lays great emphasis on research and education. It has therefore set up a dedicated Research and Engineering Division comprising Samoilov Scientific Research Institute for Fertilizers and Insectofungicides, Russia's oldest chemical industry institute (in 2014, it marked its 95th anniversary), and Mining and Chemical Engineering Research Center. The Division customizes promising in-house and international research projects so that they can meet the Company's needs. PhosAgro partners with Russia's major industry-specific research and engineering organizations, including but not limited to the National Mineral Resources University (University of Mines), Kola Research Center of the Russian Academy of Sciences, Mendeleyev University of Chemical Technology of Russia, Research and Design Institute of Urea and Organic Synthesis Products, Grodno Scientific Research and Design Institute for Nitrogen Industry and Organic Synthesis Products (Grodno GINI, Belarus), and Ivanovo State University of Chemistry and Technology. Apart from monitoring the latest developments in engineering and research, the Company uses the partnerships to engage emerging talents from among the students

Science, paid a visit to the Cherepovets College commending its educational programs and technical capacities.

## **Environment Is Our Top Priority**

In addition to actively developing and commissioning new production facilities, PhosAgro consistently upgrades key production capacities leveraging advanced environmentally friendly and resource and energy efficient technologies. PhosAgro tops the industrywide electricity selfsufficiency rankings. The facilities run by PhosAgro generate 40% of the Company's electricity and heat needs. Relying on its own resources and the accomplishments of its partner organizations the Company relishes every opportunity to get hold of advanced environmental know how that can be integrated into its production processes. A systemic approach towards environmental safety improvements has taken the Company to the top of respective rankings. All of PhosAgro's production facilities are ISO 14001 (Environmental Management System) compliant, with some business units reaping the awards for excellence in environmental protection (for example, Apatit won the European Quality Gold Medal).

On the back of the said modernization exercise, PhosAgro's monitored environmental impact metrics went down to match the benchmarks set in the EU's Best Available Techniques (BAT) reference documents. Hence, the Company's production facilities can be classified as "green businesses."



the stadents.

As part of its social responsibility strategy, PhosAgro is also working on projects to develop secondary and vocational education in Russia.

The students admitted to PhosAgro Classes launched across the Company's footprint can take advanced courses in chemistry, physics, mathematics and computer science, and continue their studies at Russia's leading technical universities. 97% of PhosAgro Classes graduates successfully pass university entrance exams.

In cooperation with local authorities PhosAgro contributes to the development of vocational education exploiting the opportunities offered by public-private partnerships. The Khibiny College of Technology and Cherepovets College of Chemistry and Technology are among Russia's leading vocational education establishments. Igor Livanov, Russian Minister of Education and

# **They Do Care!**

In December 2015, the Green Chemistry for Life grants will be bestowed for the second time upon young scientists who present a variety of countries, ranging from Italy to Australia. Who are these people? In which discipline do they succeed? What interesting papers of theirs have attracted the attention of the strict contest jury? What are the practical prospects of their ideas? They will speak on their own.

# Alexander Bissember, Australia

### Age: 31

Education: BSc degree and PhD at the Australian National University (ANU), postdoctoral research at both the Massachusetts Institute of Technology and the California Institute of Technoloay.

I am a Lecturer in Chemistry in the School of Physical Sciences – Chemistry at the University of

Tasmania. My research interests are in the general area of organic chemistry. A particular focus of my group's work is to employ transition metal-based catalysts to establish new bondforming

processes in order to prepare of fundamental organic molecules. Specifically, we seek to employ new and relatively simple strategies to rapidly construct complex and distinct molecular targets.

My project funded by the "Green Chemistry for life" program seeks to develop more viable and sustainable ways to synthesize organic molecules employing copper-based photocatalysts that operate by utilizing visible light. In addition to the challenges posed by the effects of climate change on the environment, the issue of sustainability has become increasingly important in almost every sector. The chemical

industry is no different. The limited availability of raw materials combined with environmental (and economic) concerns demands that chemists rethink traditional synthetic strategies. While in the past the approach focused only on how to dispose of toxic by-products, today it has shifted to eliminating waste at its source by making chemical reactions more efficient. This adjustment has led to the advent of more sophisticated chemical transformations and this includes the use catalytic processes. Therefore, the "Green Chemistry for life" is a much needed and particularly timely scheme. In the current climate, science and fundamental research more generally, needs as much backing as possible. The fact that this scheme is specifically designed to support early career researchers across the globe makes it particularly valuable and important. I hope that other companies will follow PhosAgro's lead and fund research towards the development green sustainable chemical processes.



# Natalia Quici, Argentina







# Svilen Simeonov, Bulgaria

#### Age: 35

Education: PhD in Pharmacy from University of Lisbon

I am working as a research fellow at the Institute of Organic Chemistry with Centre of Phytochemistry, Bulgarian Academy of Sciences, Sofia. My personal research interests are focused on green chemistry methodologies and in particular, carbohydrates derived furan platform and CO2 valorization reactions. Additionally I am carrying out research in asymmetric catalysis and dynamic kinetic resolutions. Our project is about using furfural, a product, which is produced from an agro waste, in the synthesis of new monomers, which may be used in the development of biodegradable polymers for a variety of biomedical applications. Our goal is also to use green and industrially attractive processes to achieve that. The project is a new concept and we hope that our results will promote it and make it possible for more researchers to join us in these studies. The project is interdisciplinary and joins the efforts of several institutions in Bulgaria, Portugal and Austria thus we are willing to develop an international scientific network focused on green chemistry research, where each institution will participate with its own expertise. I believe, the rise of the populations is directly reflecting the use of the resources, which are limited, and we will experience a shortage of energy, materials, food and water. We have to do a clever management and savings, but also look for more sustainable solutions. I respect all the efforts of the society in protecting the environment, I am recycling and try to reduce as much as I can the use of detergents, I have low energy consuming LED lights in my house, etc. However, what is more important for me is that I found a way to join my passion about science with the environment protection and doing my best to provide new solutions.



#### **Age:** 33

**Education:** BSc and MSc at the University of KwaZulu-Natal, South Africa, PhD at the Kansas State University, USA

I am currently working in the School of Chemistry at the University of the Witwatersrand, South Africa. My field of study is medicinal chemistry and green chemistry. Farming practices in Africa generate many waste by-products that currently have no beneficial use. Our project will investigate whether cashew nut shells, a waste by-product of cashew nut farming in Africa and a natural source of anacardic acid, can be converted into value added organic products as well as important reagents to be used in organic synthesis. I believe the project proposed innovative ways to make molecules; greener ways to make value added chemicals and could lead to capacity development in Africa. "Green Chemistry for life" is a great opportunity for young scientist to try turning their ideas and dreams into reality. I think, an increased population results in increased stresses on the environment, more vigorous farming practices, deforestation, higher rates of pollution etc., so the most relevant environmental problems today are non-sustainable population growth and climate change.



# 📕 Daniele Leonori, Italy

# Age: 32 years old

Education: MSc in Medicinal Chemistry and PhD in Organic Chemistry

I'm a Lecturer in Organic Chemistry in the School of Chemistry at the University of Manchester (Manchester, UK). Research in my group concerns the discovery and development of new and sustainable catalytic methods for chemical synthesis. We focus on developing practical and effective processes that facilitate the construction of carboncarbon or carbon-heteroatom bonds under mild and sustainable conditions. We are interested in using these novel methods to tackle problems in the synthesis of complex molecules with interesting structural architectures and biological properties. The idea at the basis of the awarded project is very simple: molecules containing nitrogen atoms are very important for the wellbeing of society. They



and organic materials however they are still very difficult to prepare. We have proposed

uses visible light (normal household lamps) as the source of energy and minimize the use of toxic reagents, dangerous reaction conditions and waste production. I intend to use the support of the "Green Chemistry for life" to demonstrate the practicality and applicability of our method. In my everyday life, I pose particular attention to waste recycling and energy as well as water saving. At the University of Manchester, we have very effective policies regarding waste management that ensures all our work-waste can be disposed in the safest way possible. I would encourage people to make sure they take great attention to the way they run their everyday life, as everything counts and small actions might overall have big impacts. However, I believe that while this is necessary we all need to support science and technology. Scientific advancements have the

are used as therapeutic agents, agrochemicals to develop an innovative approach that highest chance to provide the solutions.

# Let Us Preserve the Nature of Ours Planet for Future Generations

The Green Chemistry for Life award grants were first bestowed one year ago – back in the fall of 2014. Back then, six scientists were granted funding to deliver their ambitious scientific projects directly relating to environmental issues. What are their achievements so far? Last year's honorees speak about their theoretical research and practical solutions, environmental protection in general and the "green chemistry" project in particular.



# Anastasiya Hubina, Ukraine

#### Age: 32

Education: BSc and MS degree at the National University of "Kyiv-Mohyla Academy", PhD at the Institute of Macromolecular Chemistry NAS of Ukraine

Polymer electrolyte membrane (PEM) fuel cells are considered as clean environmental friendly efficient power source for portable, automobile and residential applications. Currently, one of the most promising trends in PEM development is using natural polymers, in particular, polysaccharides. The main idea of our research is to develop PEM based on xanthan (polysaccharide of microbial origin) via obtaining composites with polymer plasticizers (poly(vinyl alcohol) and/or modification of xanthan with inorganic acid and their derivatives. During this year, we managed to get membranes and gels and test them in the fuel cell prototype at the Karlov University. The grant was very helpful, especially taking into account our collaboration with our Czech colleagues, physicists, as we had to travel to Prague constantly and to make purchases. We were satisfied with the results, but there is no limit to perfection, so we continue to work on the project. During the testing in the prototype, we found a small problem, but we have just finished a research, that allows us to fix it. As a chemist, I was always attracted to a problem of utilization of synthetic polymers, which were widely spread in the 20th century: then we supposed to make materials that would last for centuries, and now people don't know how to utilize them. Our membranes derived from natural sources can replace industrial membranes of synthetic fluoropolymers. I like the tendency of using the polymers of natural origin like cellulose and starch. This raw material is biodegrade under the influence of external factors, and that solves the problem of utilization, and can be recycle, moreover, it is also less expensive than the production of petrochemicals.



# Juan Carlos Rodriguez-Reyes, Peru

#### **Aae:** 37

*Education:* Bachelor in Science, Pontifical Catholic University, Peru, Ph. D. Chemistry, university of Delaware, postdoctoral fellow, Harvard University.

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pure metals, some minerals do not respond well to such processes and this leads to a decrease in productivity and an increase in consumption of chemicals. The awarded project looks for ways to treat those minerals to improve productivity and decrease the consumption of chemicals. I have been very fortunate to see our goals achieved, from technical and educational points of view. We have been able to increase the extraction of silver from a concentrate from 50% to 70% and, in the way, decrease the consumption of cyanide (a toxic agent) by half. To understand the surface processes we have used advanced characterization methods. Nine students are involved into the project. In total, we are in the process of writing six scientific articles, including one with Prof. Patrick Taylor to apply the principles of green chemistry to hydrometallurgy. We have visited three of the main mining companies in Peru and we are in conversations to see if we

can collaborate more formally. All this work allowed us to receive recently funding from the Peruvian Government for continuing research in the next two years. I believe the most important environmental problem now is the water crisis: we are contaminating our limited resources of fresh water and we have not developed vet a smart solution to avoid the contamination of this resource. A problem linked to this one is that of global warming, because it is changing the icing of mountains (for example in the Andes) and this will have a tremendous effect for water transported by rivers. I try to consume less. Not only of water and energy but even things like laptops of cell phones. We feel that when our phone slows down a little we need a new one, when it actually can work for more time. We forget that these devices influence the environment and that most of their components have no a clear way to be recycled.



Peru is one of the many countries in the world that depends on mining activities. Even though there are robust, standard processes for extracting



#### Aae: 31

Eduaction: BS and PhD Chemistry, Peking University, China

I work for Department of Chemical & waste could probably regarded as a non-Biomolecular Engineering, National University of Singapore. The department has a very diversified research program. My own field is on heterogeneous catalysis and the utilization of unconventional carbon feedstock. My project for "Green Chemistry for life" targets the utilization of waste crustacean shells, including those from the crab, shrimp, and lobster and so on, into value-added chemicals and materials. The project has won a year ago probably because it is highly related to our daily life, and at the same time has significant potential application. I would say the project is going on very well! So far, we conducted collaborative research with Shanghai Jiaotong University and have obtained two high value chemicals from the waste shell. It is still early at this moment, as everything has only been conducted in the lab scale. However, yes, it is my dream to make real use of this waste. I hate some economist argues that a blooming population is essential for a strong economy. The more people, the more negative affect the environment. All

conventional resource. "Green Chemistry for life" is a great program! The funding itself is not huge, but you get a chance of interacting with senior generation of scientists as well as with researchers of your age, who share similar vision. It is a wonderful experience.



# Thibaut Cantat, France

#### Aae: 34

Education: MSc. and BSc in chemistry at the Ecole Normale Supérieure, Paris, and PhD at the Ecole Polytechnique, Palaiseau, France

I currently work at the French Atomic Energy and Alternative Energies Commission, located in Saclay (France). My research studies deal with the development of novel catalysts and transformations for the recycling of CO2 and biomass waste to added-value products. In the awarded project, we aim at developing a novel catalytic reaction where CO2 is first reduced to formic acid, the latter being utilized to convert simple amines to methylamines. Methylamines are useful chemicals in the fertilizers, pesticides and insecticides industries but also as pharmaceuticals. The project possesses a strong component of green chemistry as it targets a new way to prepare important chemicals and building blocks from a waste, namely CO2, with a high degree of energy efficiency, compared to classical petrochemical approaches. The success of the project was directly dependent on our ability to design efficient molecular catalysts for the selective conversion of formic acid. Theoretical calculations and welldesigned experiments have enabled us since the start of the project to develop such a catalyst, therefore providing a proof-of-concept. In my opinion, the mitigation of greenhouse gases is a topical ecological issue today and innovative



strategies must be developed to ensure the sustainability of our industries, both for current populations but also for future generations. Providing economic and ecological solutions for emerging countries is especially relevant, as they will face important challenges with the rise of their populations. To me, the "Green Chemistry for Life" program represents a great opportunity for young researchers to discuss and explore breakthroughs in green chemistry. It also provides an international visibility that boosts an early career.

# Sharifah Rafidah Wan Ali, Malaysia

#### Age: 34 years old

Education: BEng (Chemical) at the University of Manchester Institute of Science and Technology; PhD (Chemical Engineering) at the Universiti Teknologi Malaysia

I am the Director of Process Systems Engineering Centre (PROSPECT) in Universiti Teknologi Malaysia. I am very passionate on finding solutions to improve our environmental sustainability. The idea of our project is to change waste to resources. In Malaysia (and in other tropical countries), we consume huge amount of papaya as it is one the tropical fruits loved by the locals and easily grown, and is rich with many vitamins, antioxidants, and health benefits. The papaya is also made into other products such as preserved fruits, cosmetics, juice, herbal products and many more. Due to this, the idea came to us to find alternatives in using the papaya waste by-products. From our research, we found mango peel has been quite effective for adsorbing heavy metals from wastewater. We decided that we should try and see if papaya peel may have the same characteristic or maybe better. The results have been rewarding to us, with the efficiency even surpasses the mango peel adsorption efficiency (92 %) by almost removing 98 % of selected heavy metal ions from wastewater using its nano adsorbent. We are treating lead from wastewater, which is one of the main heavy metals that has health and hazardous effect to our ecosystem. We have been conducting experiments in preparing the adsorbents and finding the optimum conditions and modifier to enable the papaya peel adsorbent to adsorb lead effectively from wastewater. One of my PhD students, Sahar Abbaszadeh has also been attached in University of Manchester under the supervision of Prof Colin



Webb who is an expert in bioprocessing of waste product. We have also presented the work in several conferences and have submitted the research findings in several journals. I myself believe in practising what we preach. I switched off the light at areas I don't use, I closed the door to preserve the air-conditioning, I use hibernate mode for my laptop when not using it, I segregate waste in my house and I don't use water when I don't need to. I also carpool with my husband to our office and try to walk if it is just a short.

# Gasser Mohamed Khairy Ali Mostafa, Egypt

#### Age: 32

Education: BSc in chemistry, MSc and PhD in analytical chemistry at Suez Canal University, Ismailia, Egypt

search group in Suez

I am a member of a analytical instruments, which enables the determination "Do not harm yourself, are insufficient for online or of 96 samples within minutes your family

Canal University, faculty of Science, Chemistry department. The goal of our project is the development of optical sensors for the determination of heavy metal ions in aqueous samples. Heavy metal ions can be either essential or toxic to human beings and their determination is therefore of tremendous interest. Conventional methods require high cost

field monitoring. So, in this project, we need to develop an approach to analyze heavy metals from drinking water using an optical tool that consists of an array of membranes containing suitable chromogenic reagents immobilized on a transparent support. The outputs of the project are optical sensing test strips and high throughput sensing microtiter plate, which

on the area of a human hand. This saves energy, chemicals and organic solvents and time. These new sensors will contribute to improve public health as they can help to prevent the use of water that might be contaminated by toxic heavy metal. Regular testing of drinkwater using the new cheap sensors can reduce illnesses like diarrhea. I'd like to give an advice to our readers:

your environment save". Everything will return to you. There are simple things you can do today to help reduce your environmental impact, save money, and live a happier, healthier life. Save energy, gas and water. Walk or bike to work. This saves on gas and parking costs while improving your cardiovascular health and reducing your risk of obesity. Eat smart. Watch



videos about why local food and sustainable seafood are so great. Use a water filter instead of buying bottled water.

# Special issue 2015

# How It All Happened

The first grants under the Green Chemistry for Life global project launched jointly by PhosAgro, UNESCO and IUPAC were awarded in September 2014. The official ceremony was held at PhosAgro's Moscow headquarters, in a building designed by architect Alexey Shchusev for Samoilov Scientific Research Institute for Fertilizers and Insectofungicides, Russia's oldest chemical industry institute and member of PhosAgro Group since 2002. In 2014, the institute celebrated its 95th anniversary.

he award ceremony was held as part of the PhosAgro/UNESCO/ IUPAC International Symposium on Green Chemistry supported by the Commission of the Russian Federation for UNESCO and the Russian Academy of Sciences. The ceremony was attended by Vladimir Fortov, a member and the President of the Russian Academy of Sciences; Grigory Ordzhonikidze, Deputy Director of the Department of International Organizations at the Ministry of Foreign Affairs of the Russian Federation and Secretary-General of the Commission of the Russian Federation for UNESCO; Professor Maciej Nalecz, Director of the Division of Science Policy and Capacity-Building in Science and Technology, UNESCO; Building in Science and Technology, UNESCO; Professor Nicole Moreau, member of the Executive Board of the International Council for Science (ICSU); and Professor John Corish, CFO of IUPAC.



Vladimir Fortov, President of the Russian Academy of Sciences; Andrei Guryev, CEO of PhosAgro; Professor Maciej Nalecz



#### Vladimir Fortov, President of the Russian Academy of Sciences:

— Chemical industry is of paramount importance for sustainable development of our planet and mankind. That is why 2011, the International Year of Chemistry, saw the launch of a special program promoting a well-balanced and safer environment for our communities. Today, Green Chemistry is a

focus of growing attention from both researches and industry professionals, and I am thankful to UNESCO and PhosAgro for their advocacy support. The Green Chemistry for Life project exemplifies consolidated efforts of science and industry working together to reduce environmental impact. This contest offers young researches an opportunity to apply their unique knowledge in practice and draw support for further studies in the selected research area.



**Thibaut Cantat** (France) for Sustainable Synthesis of Methylated Amines and Phosphines from Carbon Dioxide;

#### Juan Carlos Rodriguez-Reyes (Peru):

This victory is of great significance for me – the grant will let me do independent research and spare me the need to look for a sponsor. Businesses are reluctant to finance projects like this viewing them as very risky. I believe that this program is very important and I would like to thank PhosAgro, UNESCO and IUPAC for supporting scientists all over the world. I am convinced that cooperation like this paves the way for solutions that will shape our future.



**Mostafa Gasser** (*Egypt*) for Development of Optical Sensors for Heavy Metals Determination in Drinking Water;

**Juan Carlos Rodriguez-Reyes** (Peru) for Materials Chemistry as a Critical Tool for Greener Mining Activities;

Anastasia Hubina (Ukraine) for Polysaccharide-based Membranes for Fuel Cells;

**Ning Yan** (Singapore) for Towards Ocean Based Biorefinery: Harnessing Shellfish Derived Chitin for Pyrrole and Acetic Acid via Hydrothermal Conversion;

**Sharifah Rafidah Wan Ali** (Malaysia) for Study of Papaya Peel Waste as Adsorbent for Efficient Lead Removal from Wastewater.

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