
CONDENSE
Collected Abstracts

CONDENsE stands for Conference on Dual-Use education and non-proliferation awareness raising. On 28-30th August STCU and ISTC hosted a conference in Ypres, Belgium. The conference brought together young scientists and participants from 17 countries. Ypres was the site of the first large scale use of chemical weapons during World War I. With this history as a backdrop the participants mulled over questions of responsibility, innovation, technological trajectories and the potential for misuse of scientific and technological developments.

During the conference each participant gave a 6 minute lightning talk on their research and societal implications which served to prime the participants and get to know each other. Participants were asked to provide a short summary following the event. This document presents the participants submisions.

The conference was organized by STCU and ISTC, carried out in partnership with the InFlandersFields Museum and funded by the European Union.

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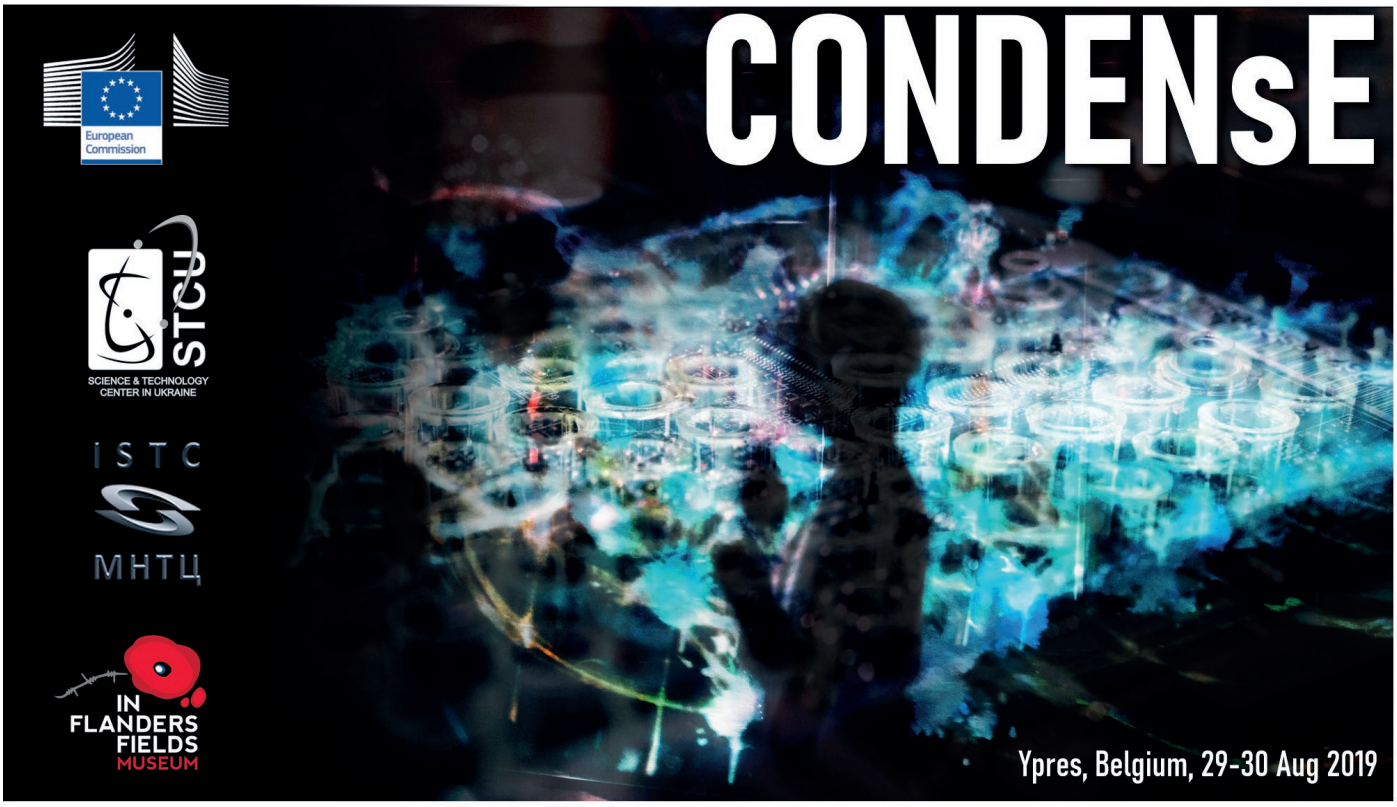


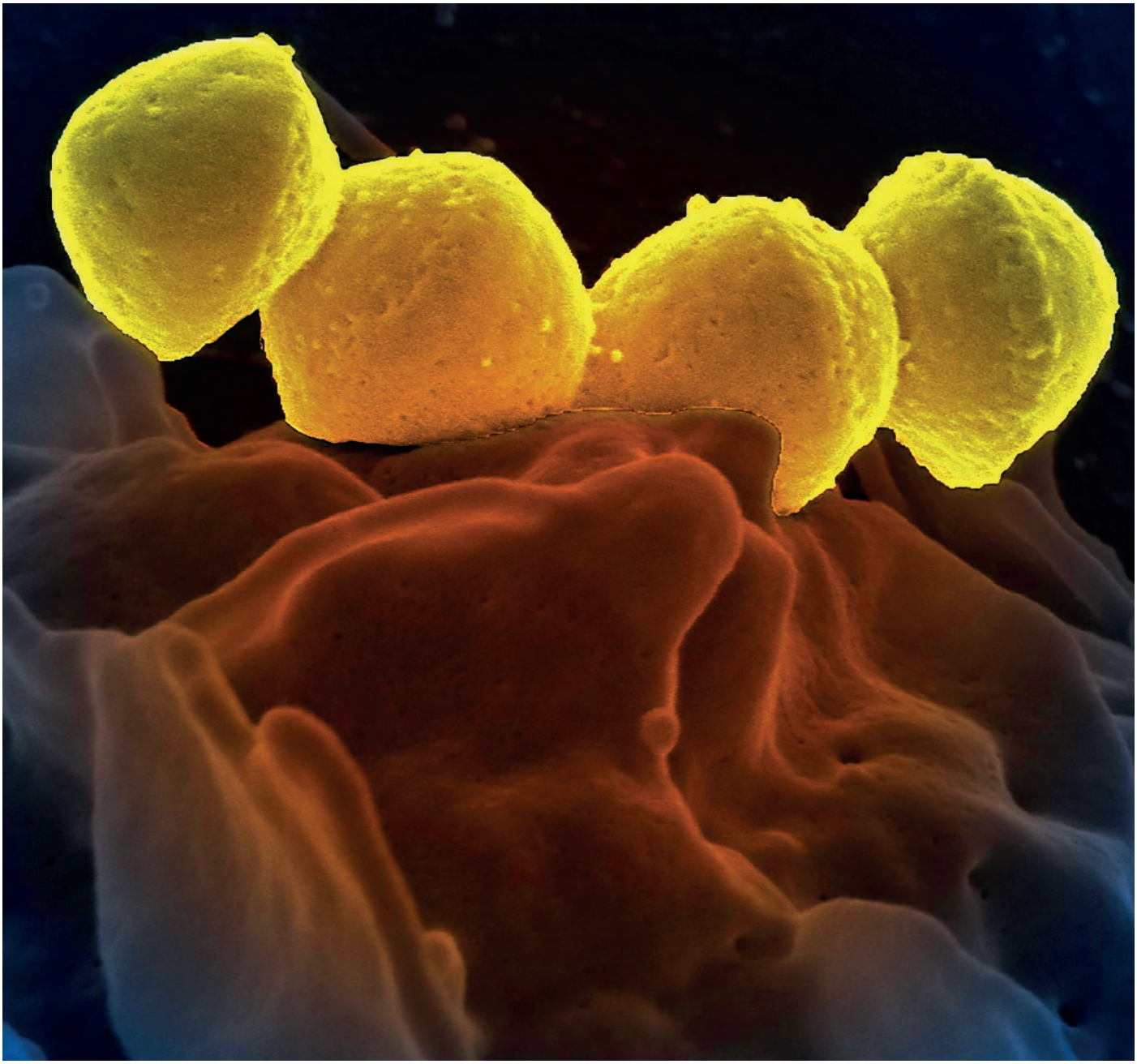
Background

In this project we are broadly addressing threats to the international community arising from chemical, biological, radiological, and nuclear weapons (CBRN). The concept of dual use refers to the misuse of civilian technology for hostile purposes. The European Commission phrased it the following way: "Dual Use in the context of science describes the potential of knowledge or technologies to be used by third parties with both benevolent and malevolent intention" (European Commission, 2018). Dual-use dilemmas arise when the same scientific work can be used for peaceful applications or for hostile purposes. Basic research as well as more applied technologies fall within the category of dual-use.

An essential part of a comprehensive export control regime is the awareness of a misuse potential in the scientific community. The scientific community is where knowledge is generated and students are taught. Therefore outreach to the scientific community and awareness raising within the community is critical to proper implementation of any technology control. All of this is widely recognised and frequently demanded, however, sustained outreach and awareness raising activity is rare (there are some notable examples in the biological area through engagement with iGem competitions). The targeted initiative of which this work package is a part focuses on eastern Europe and central Asia where there is a dearth of outreach to practicing scientist. This project aims to remedy this by contributing to and opening up a conversation with practicing scientist

The project aims to promote the peaceful and secure use of relevant scientific work and enhance the capacity of partner countries to engage with their scientific community, raise awareness in the scientific community by addressing intangible technology transfers.

The approach taken in this part of the project is broad, broader than traditional ways to engage on the subject matter of CBRN export control issues. The focus



here, at least in the practical implementation, is on scientific work and the potential for adverse societal impact to sensitise practicing scientists to their societal responsibilities. The practical implementation is in building a network of scientists through organizing a series of conferences. The first of these conferences was held in Ypres, Belgium at the end of August 2019.

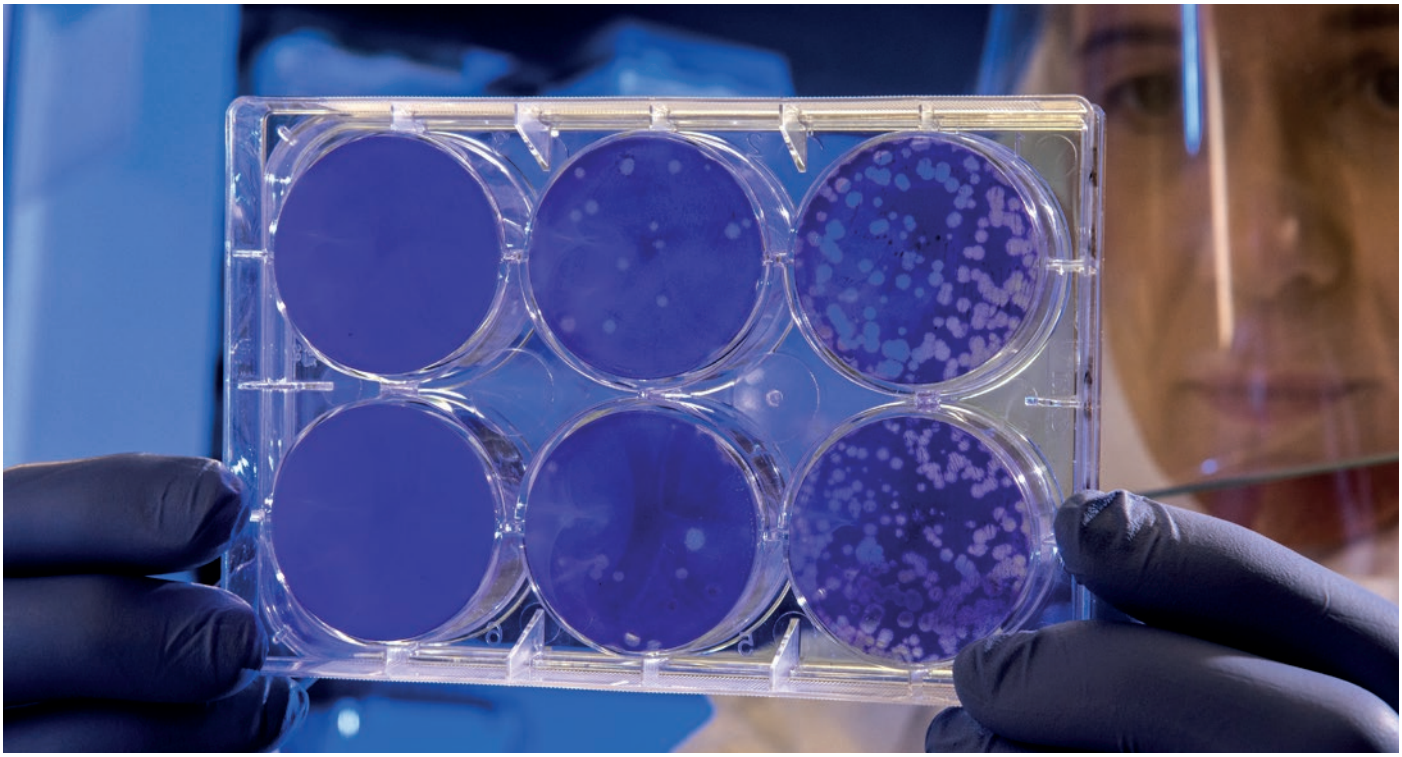
Participants were asked to prepare a 300 word abstract outlining their work and relate it to the general theme of the conference. The result was a wide variety of response reflecting different approaches and different conceptualisations of the themes and problem space. For most participants engagement with security aspects of their work was new and considering policy implications is not a common occurrence in their day to day activities.

The concept and purpose of the conference was to allow participants to explore questions pertaining to societal implications of their work and the interaction of

science and technology with wider aspects security, policy and individual agency and responsibility.

The conference itself was only a focal point of a process to engage with practicing scientists to raise awareness. This process is on-going, it started before the conference when potential participants were invited to write a short summary of their work and its societal implications, a theme that was then discussed during the conference, and continues with participants being asked to revisit their initial abstracts following the conference to update their initial thoughts in the light of the discussions and concepts introduced during the conference.

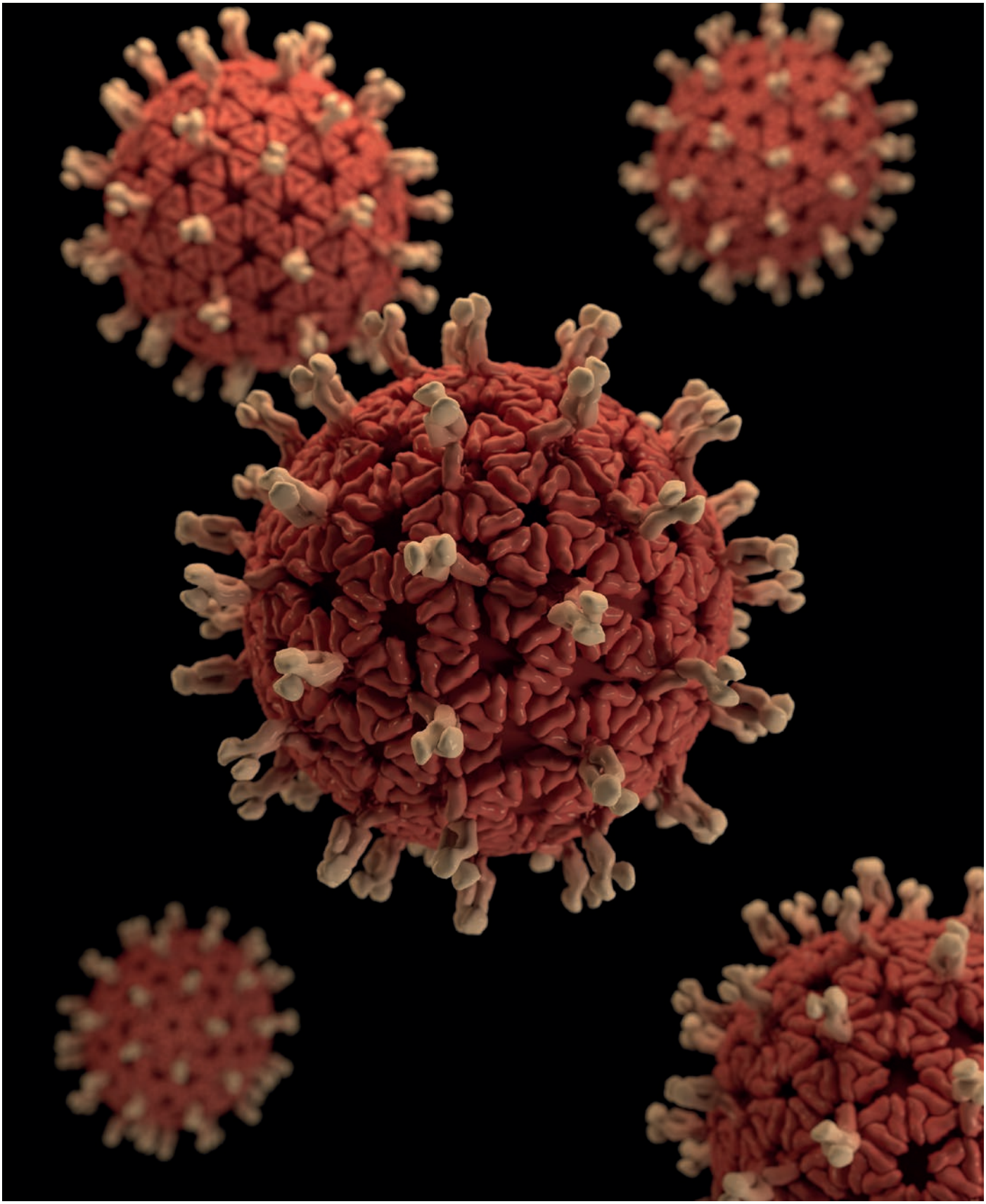
What is the point of this? The purpose is to raise awareness within the scientific community and to bridge an apparent disconnect between different communities of practice – the scientists who work on the cutting edge of potentially security relevant research and the security policy community who are often accused to talk about but not with practitioners. The participants of the conference have been carefully chosen to represent a wide variety of disciplinary background and wide geographical representation within the boundaries of our regional project. More than that, we aimed to invite excellent young researchers who will shape their respective fields



for years to come through their contributions, with their research, their teaching, their supervision of a new generation of scientist. With this selection we hope to leverage the impact of this awareness raising effort and through bringing them together to build networks of interested individuals.

As such this document, with the collection of abstracts, is a snapshot of developing thought. In a way the first stage of exploring unfamiliar concepts, new terminology. Some abstracts engage with the new concepts directly, others relate it to regulation

and wider concerns, some outline their specific area and potential applications, some used their abstract to convey feedback. More than the content, it is the emergent themes that indicate avenues, opportunities, and pitfalls of engagement strategies and awareness raising efforts to confront communities with concepts that are very different and abstract to practitioners who, in some cases had little exposure to these issues. This is a work in progress, rather than a final product, the beginning of exploring new concepts.

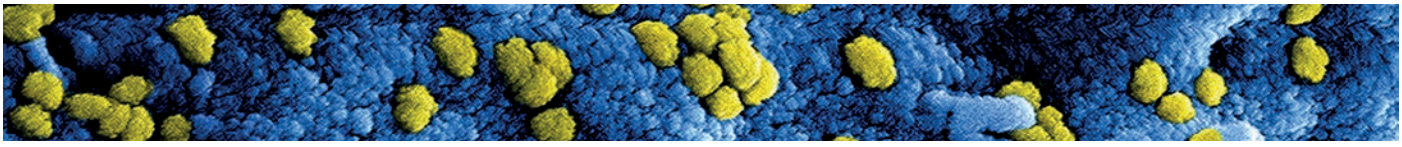


Collected Abstracts

Sohail Ahmad Jan

Department of Biotechnology, Hazara University Mansehra, Pakistan

The conference clearly discussed that Biosciences and Biotechnology are no doubt, hold promise as a means to provide maximum benefits to all living organisms. The new developed Biotechnologies i.e. nano-technology, Genetically Modified (GM) technology, CRISPR/Cas9 techniques etc. have many advantages. With passage of time various social, political, environmental and technical issues related to these technologies took their birth. For example, through GM technology many transgenic plants were developed against biotic and abiotic stress, nutrition improvement etc. The technology can affect our environment via horizontal gene transfer to non-target organism, the negative impact of selectable markers genes and use of constitutive promoter affect all the living organisms. Several reports showed that it affect the animal feeding on these GM crops. So there is needed to develop marker free transgenic crops, use of no or less toxic promoter genes and to develop transgene free crops using clustered regulatory interspaced short palindromic repeats (CRISPR)/CRISPR associated nuclease 9 (Cas9) . So work under. The participants also highlighted the safe handling of infectious microbes which can affect our environment. Specific guidelines are important to minimize the



release of infectious organism. Here we discussed to differentiate between toxic and non-toxic plant species and emphasized the safe use of these plants with no harm to living organisms. The conference emphasized on type of innovation, responsibilities of the innovator, the handling of innovation and global insecurity problems of an innovation at the start and after that. In addition, the sharing/ publishing of secret information's should be under strict guidelines and regulations. In general the conference speakers and other participants emphasized the safe use of technology and to maximize pleasure and minimize sorrow in the world. They also emphasized to develop national and international codes for the safe use of technology having no or minimal biosafety and societal issues ad it can be improve via individual responsibility, participatory action, institutional, government and non-governmental organization responsibilities. In addition it is the responsibilities of all stakeholders, donor institutes, young scientists, etc. to develop new policies and codes which ensure to minimize such hazards and to establish a baseline for the acceptance of Biotechnologies with no or minimal dual use issues. All the participants agreed that all life scientists must know about the important terms related to biosciences such as dual use research, biosafety, bioethics, codes of conduct and bioterrorism and to bring awareness in scientists /youth to minimize the hazards associated to life sciences.

Firuza Nasyrova

Institute of Botany, Plant Physiology and Genetics, TAS, Tajikistan

Code of Conduct for Scientists in the Life Sciences

Biological sciences have experienced enormous growth over the last 30 years, as biotechnology has become a global enterprise; they offer tremendous promise for meeting many 21st century challenges. Under these circumstances, it is very important to modernize education in the field of life sciences and biotechnologies. Scientists in the field of life sciences and professionals of public health must acquire the sense of responsible science at the very beginning of their professional education.

In developing countries, the level of biosafety and biosecurity education needs improvement, new disciplines must be introduced in the curricula of high schools and universities, giving the students' knowledge on codes of conduct for life scientists, dual use concerns, and biorisks. This goal can be reached by cooperation among universities, lecturers, through the information exchange on international standards and good laboratory practices, improving biosafety of society and environment, fostering the social and civic role of scientists in society, with special attention to the "next generation of scientists".

"All scientists—especially those working in the life sciences—are called to cultivate among themselves a culture of responsibility with regard to the conduct and the achievements of their research". Persons participating in any stage of research in the life sciences have an ethical obligation: to avoid or minimize the risks and harm that may arise from the malicious use of the final results of a study. In this context, scientists should:

⇒ evaluate their own research projects on the potential of "dual use" and submit reports accordingly;

⇒ strive to "be aware of" the literature data, manuals and requirements related to the "dual use" research;

⇒ to train others;

⇒ to serve as "role models" in terms of responsible behavior;

⇒ maintain a "state of readiness" in case of potential misuse of scientific research.

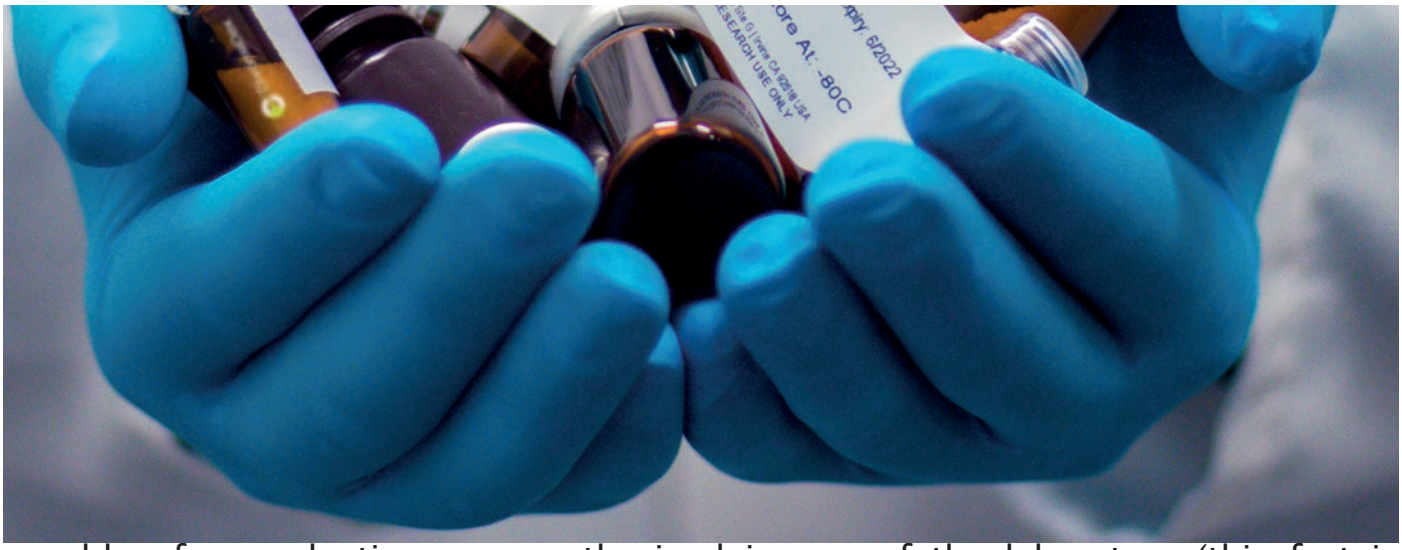
Viktoriia Zadorozhna

L.V. Gromashevsky Institute of Epidemiology and Infectious Diseases of NAMS of Ukraine

Global Polio Eradication Initiative (GPEI): Success Achieved and Potential Risk of Consequences

Poliomyelitis is an extremely heavy burden for the patient, his family and society. Mortality reaches 5–10%, and others remain disabled. GPEI was introduced in 1988. Its main tool was a live vaccine, its goal was to stop the circulation of wild poliovirus (WPV), and the vaccination afterwards. GPEI end dates were postponed repeatedly due to the fact that biological features of the pathogen and the human body were not fully taken into account at first. The results achieved are great: the number of endemic countries decreased from 125 in 1988 to 2 in 2018, the number of annual wild polio cases – from 350000 to 33.

However, new unaccounted facts emerged. This is the ability of a vaccine poliovirus (VPV) to reverse the neurovirulence under certain conditions (both natural and artificial). In 2018 these viruses were the cause of 104 polio cases. Efforts are now being made to stop the circulation of these viruses. These are the abilities of VPV to induce vaccine-associated polio, to persist in humans >10 years. Such virus acquires the properties of WPV gradually. In addition, a full-fledged poliovirus



capable of reproduction was synthesized in one of the laboratory (this fact is confirmed and described in the scientific literature). In our studies, we obtained a neurovirulent virus when VPV was exposed to magnetic fields in vitro. The studies were discontinued immediately.

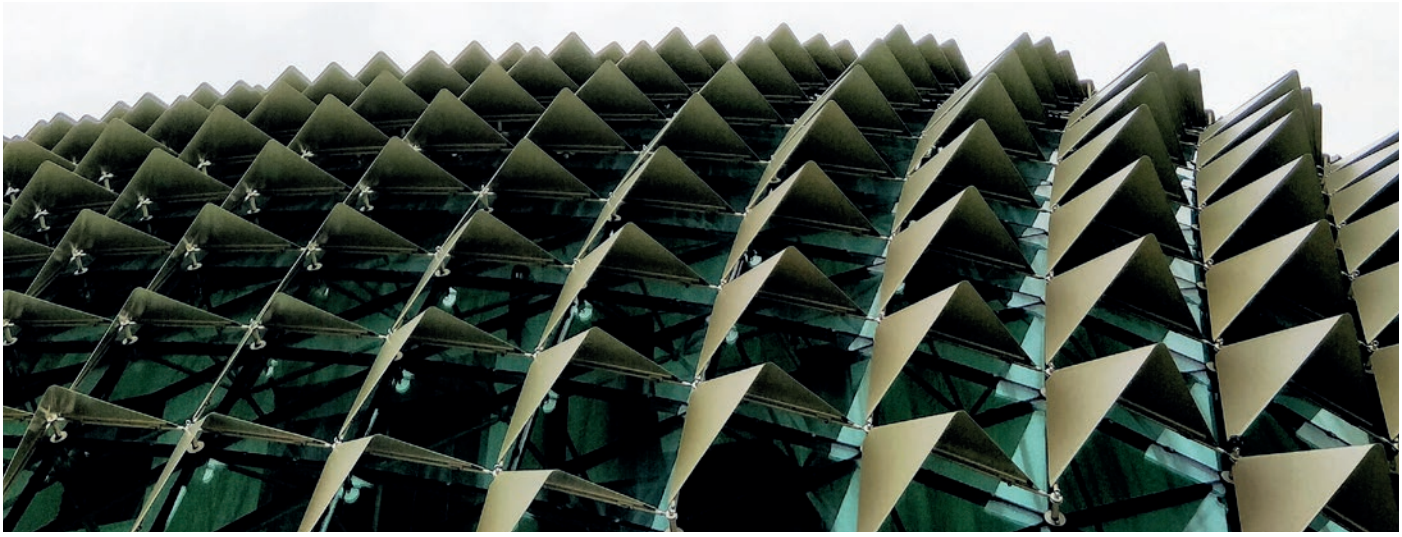
These data indicate the potential for the formation or creation of WPV even after its eradication worldwide. This raises the worrying possibility that bioterrorists could use a similar approach or such situation may arise unintentionally. This requires a thorough approach before the start of the Global Initiatives to Eradicate Infectious Diseases. When looking for success, it is also essential to look out for potential problems to avoid them when this is possible.

Galyna Zyma

National Science Center “Kharkov Institute of Physics and Technology” – NSC, Ukraine

My research interests are composed of the study of the effects of ionizing radiation on biological objects, radioecology, nonproliferation, nuclear terrorism, forensics and safety. The knowledge and experience cumulative in one area are provided very useful in another. And compliance with the principles of non-proliferation is associated with a reduction of risks in all marked areas.

Now scientists rarely associate themselves with the concept of export. So, even basic export control procedures are rarely applied. But there are a lot of challenges for nonproliferation in science. One potential threat is the unauthorized distribution of “sensitive” technologies that occur within the frames of scientific partnership. Not less problematic and sometimes dangerous it is the failure of a scientific partnership, for fear to violate the principles of non-proliferation and / or unwillingness to fulfill complex procedures. It happens, that scientists hyperbolize possibilities of their investigations in order to emphasize the importance and perceptiveness of their work, in thirst for the glory and have interest in forming of specific believes – thus



tense situations are arisen, and solving of which demands time, material and human resources. The resolution of these collisions will serve as a stimulus for scientific progress, without negative influence.

So, it is really important that scientist will be informed in nonproliferation principles, understand, share and conscious them and will be responsible for the results of their work. It is a part of professional hygiene and professional culture.

The decision is to implement nonproliferation at all levels of scientific world – individual, institution, global. That is to rise awareness in scientific sphere and to educate professional culture from the start of high-level education; to implement internal export control procedures and approval of international transfers, as successfully is doing in NSC KIPT; and to develop and strengthening international cooperation in nonproliferation and export control.

Lela Urushadze

National Center for Disease Control and Public Health (NCDC) of Georgia

As a scientist I address my scientific work to make humans life healthier and easier. Actually I am working for research emerging infection pathogens such are Polio, Corona and Lyssa viruses, I am working to find source of these pathogens and eradicate them. CONDENseE conference helped me to sea from other side all step of my research, to understand that the same pathogens could be used as a bio weapons.

Recently I am conducting emerging pathogens research in Georgian bats, the most part of the work is performing on field laboratory In order to mitigate the spread of contamination, avoid exposure, we changed biosafety issues. Instead of lethal sampling and dissection method we used non-lethal field sampling, which decrease the chance for spillover and misuse of bat borne pathogens in environment during the field work, the same protocol we sheared with Ukrainian and Armenian bat scientists. In the same research we obtain samples from tree different countries (Turkey, Armenia, Azerbijan), I clearly understand that misuse or dual use of biological samples can be done in transportation stage as well, so I use packing and shipping samples with international approved guidelines. After Condense meeting I sheared gained knowledge and approach with my laboratory colleges and head of department. Meeting in Ypres helped me once again realize that as a scientist my primary duty is to prevent the misuse of my scientific research and use it just for benefit mankind.

Tamar Kutateladze

NCDC&PH,Tbilisi,Georgia

Condense conference reached its goal and profoundly raised awareness of participants on dual use issues and the potential of sciences to be misused. Looking back I see, that all we do has it's own advantages and disadvantages and knowledge of science can be misused for own selfish means. The conference helped me to see, that some science and technology can be used for destructive purposes as well as for constructive purposes. Scientists have a special responsibility when it comes to problems of "dual use" and the misuse of science and technology.

I work on enteroviruses, mainly with poliomyelitis investigating samples from patients and sewage mainly to detect and identify polioviruses. Every mistake made in lab investigation during its elimination phase will be irreparable.

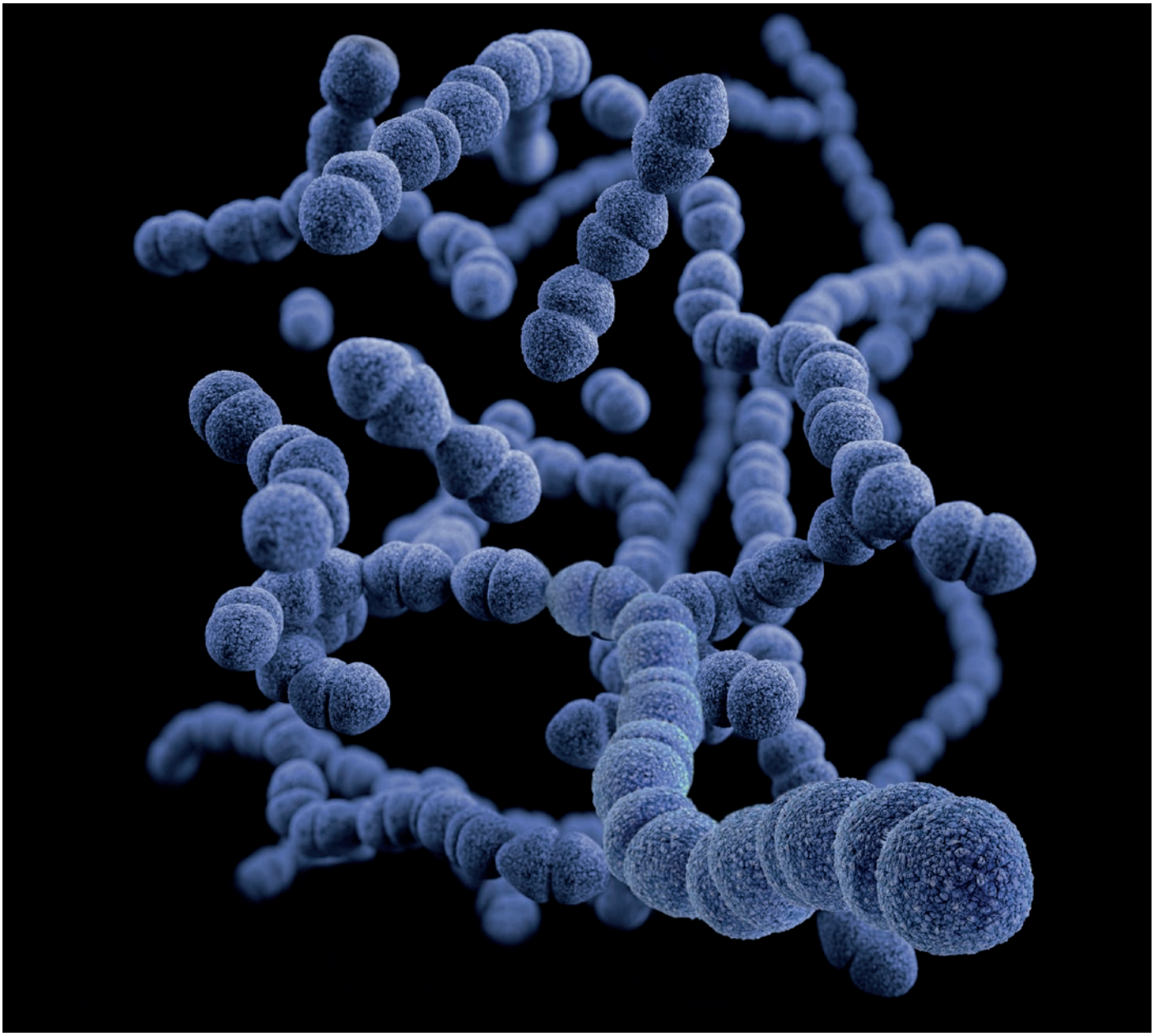
Also I am involved in the projects investigated arboviruses. In the frame of this project were identified species of mosquitoes responsible for viral transmission. It is first time Aedes albopictus and Aedes aegypti, an epidemiologically important vectors for the transmission of Yellow fever, Dengue fever and Chikungunya fever viruses is discovered in Georgia. Findings from the studies will be important for public health, as they will be used for developing and implementing appropriate diagnostic and control strategies for arboviruses in Georgia, but if do not follow all laboratory quality standards and biosafety requirements viruses from our labs can be spread due to the presence of the carrier. We have to assess our research projects and be aware of their misuse potential.

The threat from biological weapons is again a live issue. Bioterrorism represents a global threat caused by the use of microorganisms or their toxins with the purpose of causing death or a disease in humans, animals or plants. We are scientists working with agents such as pathogenic organisms and have a responsibility to use good, safe and secure laboratory procedures.

Veaceslav Ursaki

Academy of Sciences of Moldova, Institute of Electronic Engineering and Nanotechnology “D. Ghitu”

Our research group is developing ultraviolet (UV) detectors based on n-type Zn1-xMgxO compound thin films which are deposited by aerosol spray deposition or spin-coating method on p-type Si substrates. Both deposition methods are versatile, environmentally friendly and cost effective, because they do not need high vacuum or other costly equipment. Particularly, UV photodetectors in metal-semiconductor-metal configuration as well as heterostructures working as injection photodiodes have been developed. An important advantage of the ZnMgO material system relays on the possibility to tune the bandgap of the semiconductor in a wide range by changing the x-parameter. Therefore, all the three bands of the UV (visible-blind) spectrum can be covered: the UVA band (320 nm to 400 nm), the UVB band (280 nm to 320 nm), and the UVC band (160 nm to 280 nm). The UVA and UVB bands are covered by the wurtzite phase of films, which is obtained in films with the content of Mg up to 40 %. We are now working to produce high quality cubic phase of films with higher Mg content, in order to cover the deep UVC band, which is in the solar-blind spectral region. The UV radiation is known to be harmful to the human body, particularly, it may cause skin cancer. Therefore, the development of novel effective UV photodetectors that exhibit high UV sensitivity but are blind towards standard visible radiation is of great importance in health and medicine and other civilian fields such as infrastructure, environment monitoring, unattended stations, fire alarms, combustion monitoring, solar astronomy, space-to-space transmission etc. However, they have also military applications such as missile plume detection, explosives and other threat agent detection, camouflage systems etc. Our goal is to promote the civil applications of the produced UV photodetectors instead of military applications.



Yergali Abduraimov

Research Institute of Biological Safety Problems, Kazakhstan

The use of technology for dual purposes, especially scientific developments to the detriment of humanity, as well as their control today is very important. Therefore, it is necessary to strengthen control over their use in various institutions and organizations. Undoubtedly, the scientist may not be aware of the possible future consequences of the technology being developed, therefore, for every developer of the new technology to understand the possible consequences of his research in the future, seminars and trainings should be held in which competent trainers explained that the technology can be used for double purposes in some cases . In addition, it is necessary to organize and conduct regular trainings for trainers from different countries with the involvement of competent world experts on the use of technology for dual purposes. Trained trainers from different countries could contribute to a better understanding of the use of technology for dual purposes by scientists and developers.

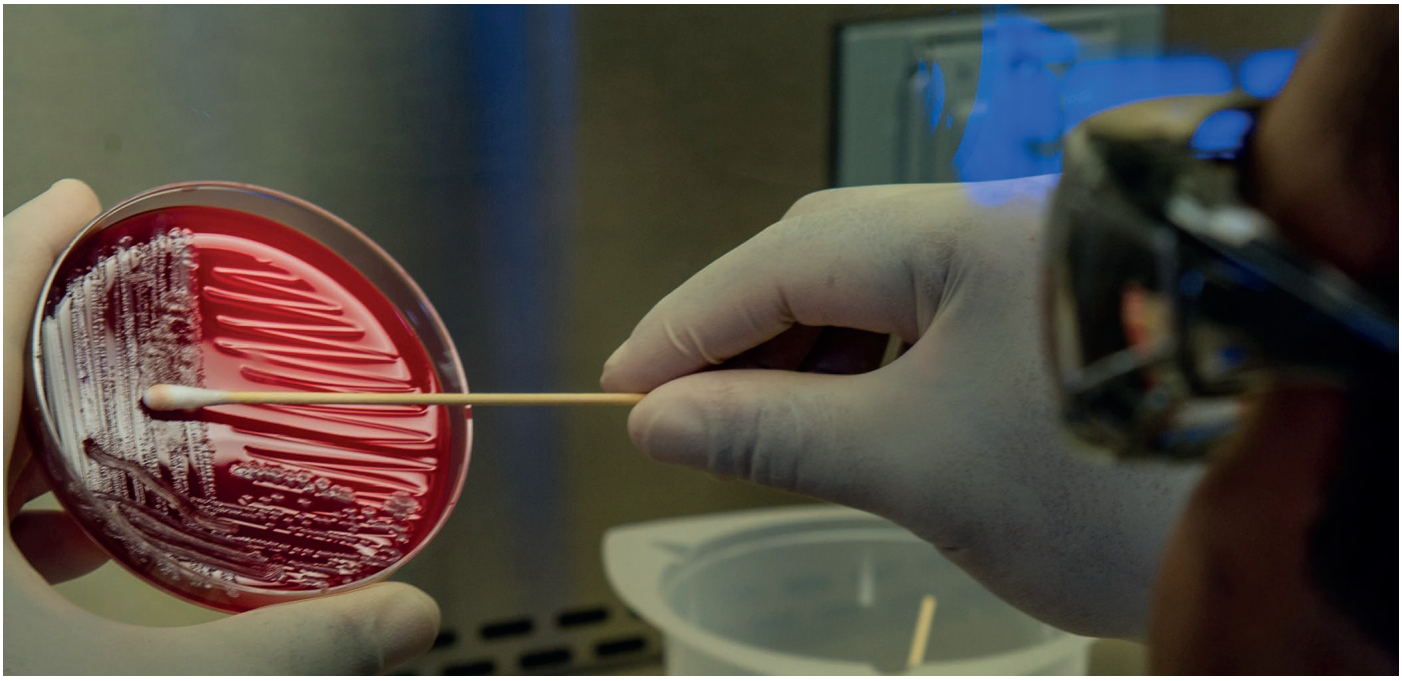
Eduard Monaico

National Center for Materials Study and Testing, Technical University of Moldova

One step fabrication of GaAs nanowires via anodizaton and their application as Infrared Photodetectors.

Our group deals with electrochemical nanostructuring of semiconductor materials. Nowadays 1D III-V semiconductor nanowires (NWs) attracted significant interests in fundamental physics and promising applications of high-performance room-temperature infrared (IR) detectors.

Herein, a simple and cost efficient technology for GaAs and InP nanowires fabrication via one step electrochemical etching is presented. The idea of the elaborated technology is that the nanowires are not grown, but the space around of nanowires or ultrathin walls is etched. As a result, the remained nanostructures have the same parameters and quality as the as-grown bulk crystal. The pores in semiconductors are usually introduced via electrochemical dissolution of materials in electrolytes containing acids such as HF, HCl, H2SO4, HNO3 etc. or in alkaline electrolytes. To make the process of nanofabrication based on anodic etching broadly accessible and environmentally friendly we demonstrated pore formation in aqueous solution of NaCl. To be noted that the shape of obtained GaAs nanowires is triangular in contrast to the circular shape of nanowires obtained by traditional techniques. The diameter of nanowires can be modified by concentration of the electrolyte and applied potential. Using different crystallographic orientation of the bulk crystals it is possible to obtain nanowires with the same crystallographic orientation. The study the photoelectrical properties as a function of temperature of the elaborated GaAs nanowires is performed. The elaborated photodetector demonstrated high responsivity and fast photoswitch in the IR region of the electromagnetic spectrum. Infrared photodetectors (IRPDs) have become important devices in various applications. IR detection also enables many non-contact, non-destructive inspection methods that are widely utilized in industry and medical applications. On the other hand, the same regions of the electromagnetic spectrum of radiation are also widely used for night vision, target acquisition, missile tracking, and environmental sensing for military applications.



Nigar Mutalibova

Azerbaijan State Advanced Training Institute for Doctors

In the light of the discussions held at the Conference on Non-proliferation and Dual-use Awareness there is a growing need for greater control over research that is, to one degree or another, related to the development, production, application of various scientific methods that could pose a threat to security. The issue of the non-use of biological weapons has been resolved categorically and unambiguously, but the threat to biological safety, which with a certain probability can be encountered in diagnostic laboratories, requires constant and high-quality monitoring of their activities. Numerous and many-sided measures are being taken in Azerbaijan to strengthen biological safety, especially when dealing with especially dangerous infections (training for staff, audit of laboratory activities, etc.). However, the activities of routine microbiological laboratories involved in the diagnosis of most infectious diseases require more intensive and systematic monitoring.

In view of the foregoing, it is necessary to conduct risk assessment studies in basic microbiological laboratories involved in routine research. It is necessary to conduct an assessment of the awareness, qualifications of laboratory personnel, the safety of laboratory equipment, medical monitoring of the health of laboratory personnel and measures to organize their training. Of particular importance is the investigation of laboratory infections that have ever occurred in laboratories. The focus should be on monitoring the proper disposal of waste and decontamination.

Monitoring the activities of these laboratories should be implemented at the regional and national, as well as international levels, guided by international safety standards. At the same time, it is important to try to identify the standards by which laboratories operate, to generalize the conditions and operating procedures for laboratories of the same profile.

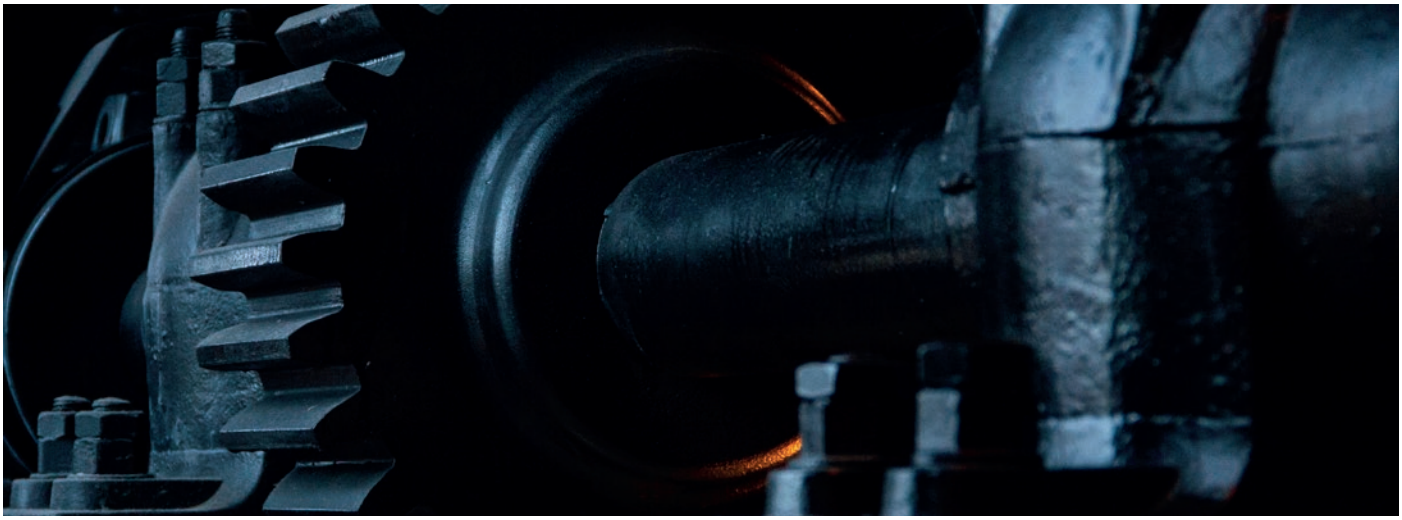
Muhammad Ovais

CAS Key Laboratory for Biomedical Effects of Nanomaterials and Nanosafety, CAS Center for Excellence in Nanoscience, National Center for Nanoscience and Technology (NCNST),Beijing, P.R. China

Dual use Concerns in Precise Nanomedicines

Precise nanomedicine has been extensively explored for efficient cancer imaging and targeted cancer therapy, as evidenced by a few breakthroughs in their preclinical and clinical explorations. Scientists around the globe are developing effective and targeted cancer nanomedicines via utilizing multidisciplinary approaches. Current advances in the development of smart cancer nanomedicines, with the inclusive understanding of their structure-function relationship and potential Dual-Use are vital. Healthcare applications of Nanoscience and Technology are rapidly evolving with innovations in personalized therapy and diagnosis. It's an exciting century to be alive, as convergence of various disciplines has really opened exciting avenues in personalized theranostics, such as the interface of AI for healthcare. The ability

of nanomaterials to cross the blood brain barrier (BBB) and targeted delivery of payload to anywhere in the body are points to ponder. Nanorobots with the potential of targeted in vivo drug delivery present concern of potential Dual-Use, as the technology can be utilized for the delivery of stimulus responsive nefarious agents via sophisticated mechanisms. The fate and toxicity of nanoparticles in environment and their accumulation in the ecosystem is also point of concern, as complete control over the nanoscale materials is not possible. After the in vivo administration nanoparticles are inevitably surrounded by many biomolecules particularly plasma proteins, forming a novel surface named 'protein corona'. Protein corona may have a strong effect on nanoparticles biodistribution, targeted drug-delivery, efficacy, and toxicity. Foreseeing the advancements, it's vital to develop regulations and guidelines in precise nanomedicines that share common grounds between scientists and policy makers.



Khalil Ali Talha

Qarshi University, Pakistan

Research innovation through nanosciences and nanotechnology on the interface of various convergent disciplines like medicine and smart materials has exciting applications but at the same time raises a dual use dilemma and dual use research concerns (DURC). The potential risk in the abusive use of nanotechnological interventions can have detrimental effects on the security at the social, regional and international levels. Nanomaterials has the potential ability to cross the blood brain barrier causing safety and toxicological concerns. Unseen, unmanned aerial and aerosolized nano-bioweapons could go inside the body merely by inhaling and the sophisticated delivery mechanism. Some of the nanoparticles have active surface which can generate free radicals which can cause harm to the normal cells. Inhaling of nanoparticles has been associated with mortalities. Another debate is about the fate of the nanoparticles in environment. Accumulative evidence suggest bioaccumulation of metal nanoparticles in food. Nanotechnology arms race can have detrimental impacts. The programmable nanomachines and nanorobots presents another concerns of the hypothetical end of the world scenario called the grey goo. Nanotechnology has experienced expeditious developments just similar to the biotechnology, and necessitates the need of proper regulations and guidelines to prevent the security and dual use issues. With all of the perks that nanotechnology brings to science and technology, there are issues on social and ethical grounds which needs great attention.

Emilya Titanyan

Law Department “National Bureau of Expertises” at the National Academy of Sciences of the Republic of Armenia

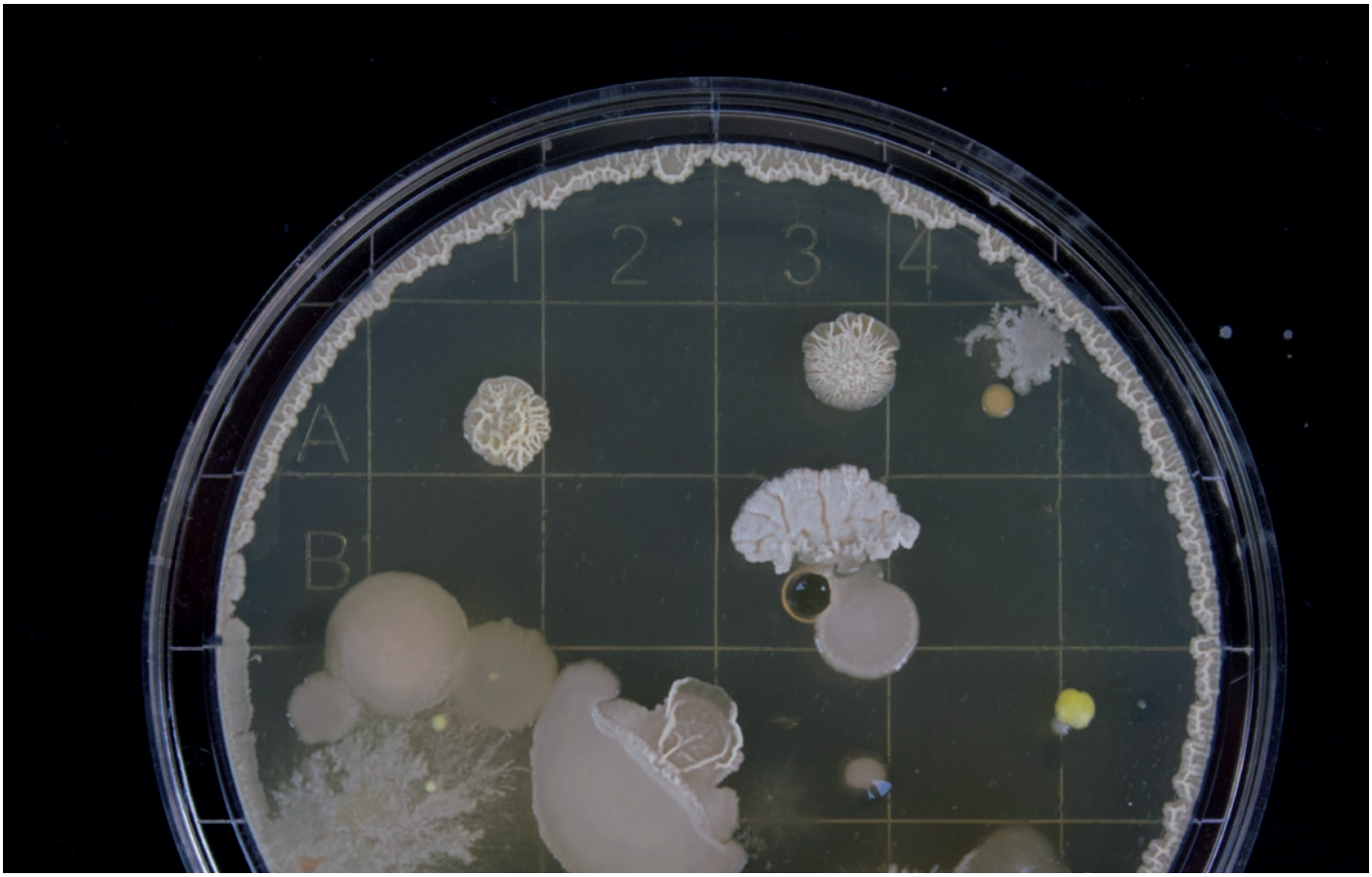
Some features of transboundary intangible transfer of sensitive technologies

In the age of scientific and technological and network globalization, when such projects as “science without borders” are more than welcome, computers, phones, other devisees and internet create easy ways for exchanging information, including transfer of sensitive technologies.

During our research we mostly faced with two types of proliferation concern of sensitive technologies and information: so called “conscious” and “unconscious” transfer of possible dual-use information. And nowadays the last one is a big problem for us because Armenian scientists who worked in post soviet union area, now don’t have criteria about ITT, easily provide information during international scientific conferences, specialized and company exhibitions, grants, publish articles and abstracts or smth else. In the current situation, due to the lack of clear criteria and in order to avoid the any transfer of possible dual-use information, the government mainly uses the practice of total control, which causes frequent misunderstandings and discontent of the scientific community, which is forced to limit communication.

It is known that some information that is considered secret in one country is published in open sources in another one. Although the “fundamental research” is defined in the Lists quite clearly, nevertheless there are some attempts to publish open articles on fundamental research, while these studies are not as such (sometimes this is done in order to avoid the stage of obtaining a license, and sometimes because of the lack of awareness of whether the research is fundamental or not).

Currently, in this segment of export control, the topical issue is what to control



and how to control it, as well as how to balance the publicity and security of the exchange of research results.

Due to the lack of clear criteria of dual-use information export control makes government agencies use the practice of total control, which causes discontent of the scientific community.

Nowadays a number of obvious problems have accumulated, aggravating the process of regulating intangible technology exports, particularly: the problem of outdated technology and information, i.e. how old should technology or information be so that its transfer does not compromise security, and how to classify people according to the degree of "sensitivity of knowledge", how long should they be under control.

It should be noted that the fundamental results of modern science are in many cases dual-use information, because in many fields of science basic research and military research overlap.

A delicate and unregulated question also is whether it should be prohibited to teach foreign students sensitive specialties.

Thus, the low efficiency of the control of intangible technology transfer requires conducting researches to improve this type of export control.

The existing problems of controlling intangible technology transfer should most likely make countries to cooperate and join forces in preventing the illegal transfer of sensitive information.

Tea Tevdoradze

NCDC/Lugar Center, Tiblisi, Georgia

The major goal of the research center where I work is the control of infection disease in our country, which is for public health. Currently, I am working as a molecular biologist and involved in many scientific projects. Due to the fact that our main study objectives are especially dangerous pathogens (EDP) such as Yersinia pestis, Bacillus anthracis, Brucella spp., and Francisella tularensis, we know how important to follow the rules of biosafety using all required equipment and knowledge for working in the biosafety level 3 laboratories (BSL). Thus, I was aware of the possible risk of using biological agents as weapon and about bioterrorism. But the Condense conference gave me more understanding and deeper knowledge in dual use concern and misuse in life science research. During the conference I found out and realized that recent technological advances in the genetic field such as gene editing or gene synthesis have brought the dual use nature of biological research.

My research focus is on the Shiga toxin producing E. coli (STEC). Actually, most types of E. coli are harmless and help keep our digestive tract healthy. Besides, E. coli is used as model organism in life science research and plays an important role in modern biological engineering and industrial microbiology. However, there are some strains that have evolved into pathogenic E. coli by acquiring virulence factors through plasmids or bacteriophage. So the good bacteria gained ability to produce toxin genes and bad STEC strains cause very severe diarrhea diseases. Changes in nature are already taking place through our intervention or independently of us, and so much remains to be studied. Even working on E. coli, I realize how big is scientist responsibility, and how important it is to assess the risk for each experiment, research or innovation. All research fields should be aware about dual use concerns and very carefully consider all possible misuses of life science research.

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