

Twinning Project Days
March 24-25, 2021



NanoMedTwin

Coordinator:

acad. Ion TIGINYANU

Technical University of Moldova

(National Center for Materials Study and Testing)



At a glance



<i>Full title</i>	Promoting smart specialization at the Technical University of Moldova by developing the field of Novel Nanomaterials for BioMedical Applications through excellence and twinning
<i>Project instrument</i>	Coordination and support action funded under HORIZON2020 Call H2020-WIDESPREAD-2016-2017
<i>Start date</i>	November 1st, 2018
<i>Duration</i>	36 months (November 2018 – October 2021)

Consortium



**Technical University of Moldova -
Project coordinator**



**Hannover Medical School (MHH),
Germany**



**University of Bristol
(UNIVBRIS), UK**



**Royal Institute of Technology
(KTH), Sweden**



**Joint Research Centre (JRC),
Ispra, Italy**



EFPC Ltd (EFPC), Israel



Objectives



Goal: to promote the Smart Specialization Strategy in Moldova through developing the field of nanomaterials for biomedical applications by enhancing the scientific excellence of the National Center for Material Study and Testing (NCMST) of the Technical University of Moldova via a collaborative strategic partnership program with world leading centers which are established in the EU

O1: Promotion of the **link between NANO and BioMedicine** fields

O2: Training of a new generation of highly-skilled researchers capable of developing **novel nanomaterials for biomedical applications** and creating a leading national infrastructure in these fields at NCMST

O3: Developing a strategic programme focusing on the field of nanomaterials for biomedical applications, **establishing links with medical institutions** in Moldova and **building of capacities for promotion of technology transfer**

O4: Extending networking and collaboration and creation of capacities for broader participation of NCMST and other linked research groups in Moldova in the Horizon 2020 Programme and future Programmes

Main activities



- **Theoretical courses at TUM**
- **Student visits at partner institutions (4-6 months)**
- **Short term expert visits (~2 weeks)**
- **Summer schools**
- **Conferences**

Training activities

Training courses in the NanoBioMedicine – 188 hours



- The training courses (188 hours) on NanoBioMedicine started in October 19, 2019 and last till May 2020 (last lectures were delivered online due to the COVID-19 pandemics).
- The lectures were organized on Friday (17:00-20:00) and Saturday (9:00-14:00) at the premises of the Technical University of Moldova, Faculty of Computers, Informatics and Microelectronics.



Practical lecture on Biomaterials, Biocompatibility and Bioengineering, delivered by prof. Viorel Nacu

28.01.2020

The Advanced Training Course on Nanotechnologies and Biomedical Engineering organised by NanoMedTwin project recommenced after the winter break.

As part of the module Biomaterials, Biocompatibility and Bioengineering delivered by prof. Viorel Nacu, the students attended interactive lecture at the Laboratory of Tissue Engineering and Cell Cultures from the State Medical and Pharmaceutical University of Moldova.

The Biomaterials module aims to focus on issues such as regenerative medicine, cellular and gene therapy, stem cells, natural and synthetic biomaterials, tissue engineering in clinical practice.



Training activities

Training courses in the NanoBioMedicine – 188 hours



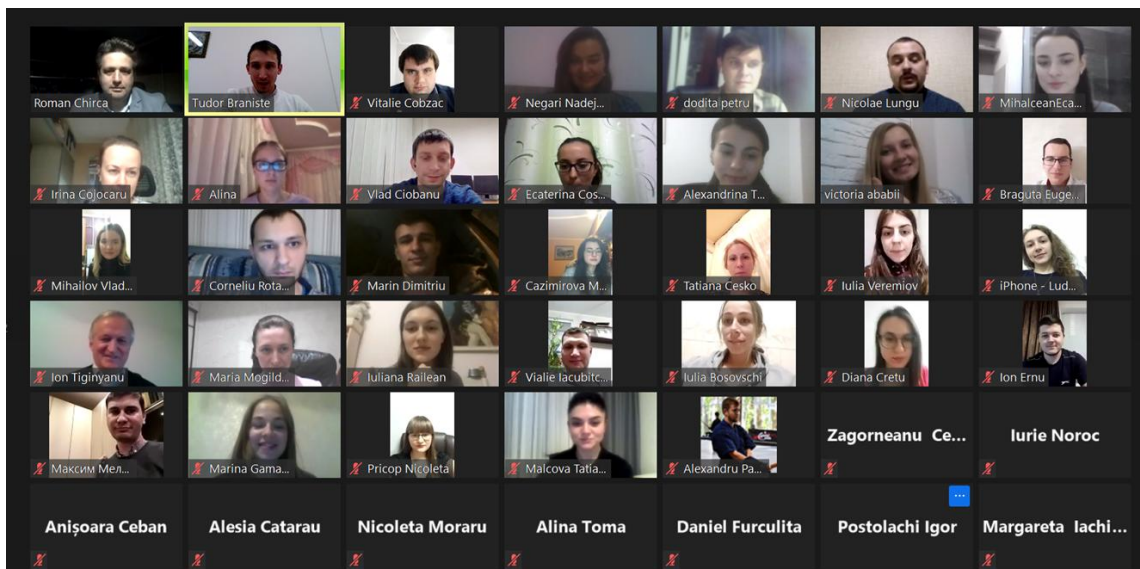
- **Introduction to Nanomaterials, Nanotechnology, Nanoelectronics, and Nanomedicine (Module length: 30 hours)**
- **Micro electromechanical systems (MEMS), Nano electromechanical systems NEMS), microfluidic lab on a chip and their integration in product design (Module length: 30 hours)**
- **Nanomaterials for Biomedical Applications with a series of sub-modules:**
 - **Anatomy and Physiology (Module length: 24 hours)**
 - **Bioinstrumentation (Module length: 24 hours)**
 - **Biomaterials, Biocompatibility, and Bioengineering (Module length: 40 hours)**
 - **Nanotechnologies and nanomaterials at the nano-biointerface (Module length: 40 hours)**

Training activities during the COVID-19 Pandemics

Intellectual Property and Technology Transfer Courses



- In the period October – December 2020, about 45 students and young researchers from different national organisation participated in a theoretical training course (60 hours) on Technology Transfer and Intellectual Property Protection.
- During the lectures, which were fully **online** due to the Pandemics, the students got familiar with specifics of **Intellectual Property** protection in Moldova, presented by Mr. Andrei Moisei, the main consultant at the State Agency on Intellectual Property. **Technology transfer and innovation management** were explained in detail by Mr. Roman Chirca, director at the Institute of Market Economy. The final subject focused on **Open Science**, research data management and open scholarly communication with dr. Igor Cojocaru, director at the Information Society Development Institute.

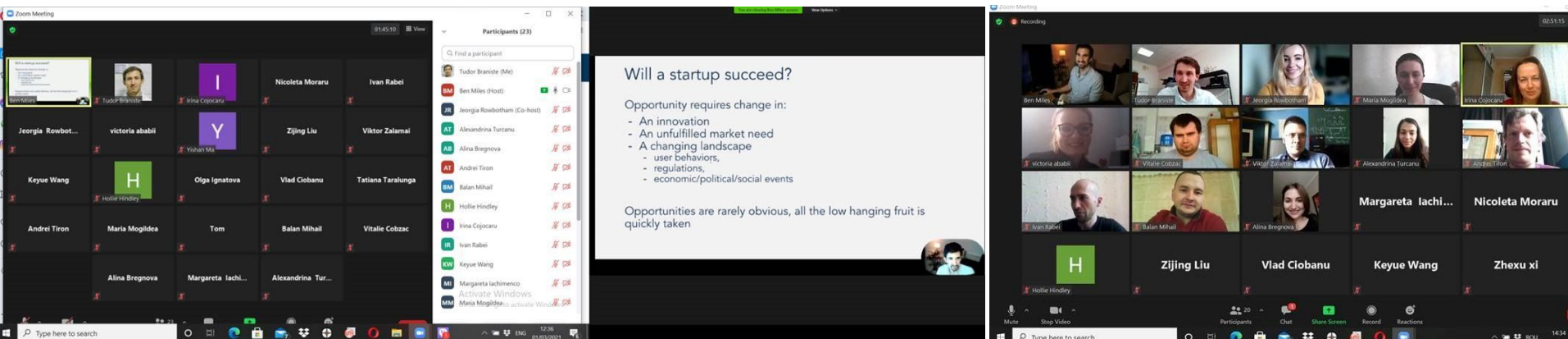


Training activities during the COVID-19 Pandemics

Research and Innovation Workshop series delivered by Spin Up Science Team (UK)



- During the first week of March (1-5), more than 15 PhD students and researchers from Moldova and 5 Master students from the Bristol University participated in Research and Innovation Workshop series, delivered online by the [Spin Up Science](#) team from the UK.
- During the five days' workshop students learned about the main features of the entrepreneurship, the different types of business opportunities (e.g. market pull, technology push, etc.), about assessing market opportunities, the concept of Minimum Viable Product (MVP) and how to get inside the minds of potential customers by means of user journeys. The course also included topics such as intellectual property, negotiating a spin out, understanding stakeholders or raising finance.



Involvement of students in research

Identification and initiation of a new generation of researchers

- Students from different fields, who are attending the [Advanced Training Course on Nanotechnologies and Biomedical Engineering](#), have showed their research interests and made presentations about the state of the art in their respective areas of interest:
 - **Phagotherapy** (Diana Cretu, State Medical and Pharmaceutical University, 6th year student)
 - **The importance of bacteriophage encapsulation** (Alexandrina Turcanu, Technical University of Moldova, 3rd year student)
 - **Liposomes: An overview** (Iulia Veremiov, State Medical and Pharmaceutical University, 2nd year resident)
 - **Tissue engineering** (Tatiana Malcova, State Medical and Pharmaceutical University, 3rd year PhD student)
 - **3D nanostructures based on wide-bandgap semiconductors** (Irina Plesco, Technical Univesity of Moldova, 3rd year PhD student)
 - **Characterization of GaN-based nanoarchitectures** (Vladimir Ciobanu, Technical Univesity of Moldova, 3rd year PhD student)



Training activities

Student visits for training at research intensive institutions



- Student visits have been carried out to MHH (6 months), JRC (4 months), UNIVBRIS (4 months) and KTH (5 months) also including participation at specific modules of MSc and PhD programs.
1. Vladimir Ciobanu, PhD student, NCMST, TUM (01 Oct 2019 – 31 Jan 2020) to JRC, Italy
 2. Olga Ignatov, PhD student, Moldova State University of Medicine and Pharmacy (01 Oct 2019 – 31 Mar 2020) to MHH, Germany
 3. Andrei Tiron, Phd Student, Technical University of Moldova (15 Oct 2019 – 31 Jan 2020) to UNIVBRIS, UK

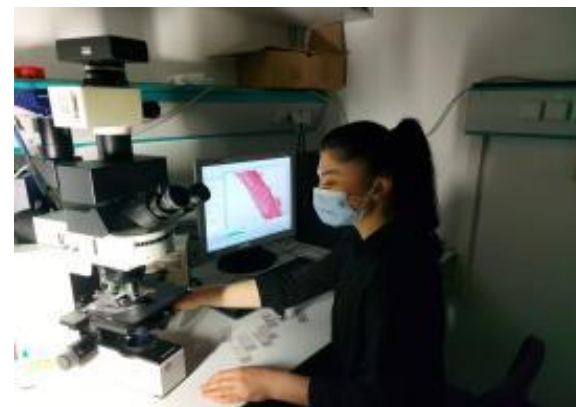
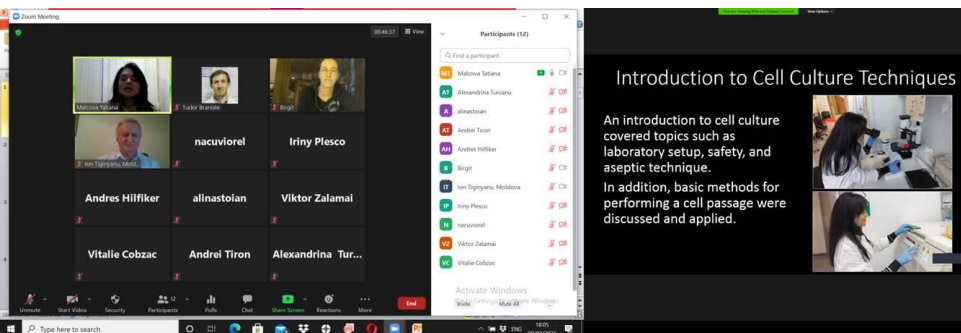


Training activities during the COVID-19 Pandemics

Student visits for training at research intensive institutions



1. Irina Plesco, PhD student, NCMST, TUM (15 March 2020 – 31 July 2020) to KTH, Sweden
2. Andrei Tiron, Phd Student, Technical University of Moldova (15 Sept 2020 – 31 Dec 2020) to KTH, Sweden
3. Tatiana Malcova, PhD student, Moldova State University of Medicine and Pharmacy (planned 01 April 2020 – 31 Oct 2020 – realized: 01 Sept 2020 – 28 Feb 2021) to MHH, Germany
4. Alina Stoian, PhD student, Moldova State University of Medicine and Pharmacy (01 Oct 2020 – 31 March 2021) to MHH, Germany
5. Iulia Veremiov, , PhD student, Moldova State University of Medicine and Pharmacy (1 Nov 2020 – 28 Feb 2021) to UnivBris, UK
6. Nicolae Magariu, Phd Student, Technical University of Moldova (1 Sept 2020 – 31 Dec 2020) to UnivBris, UK



Covid-19 influence

- **All the visits to Italy have been postponed to an undetermined period;**
- **The visits to Germany were interrupted for 6 month;**
- **The visits to Sweden are interrupted since January 2021**

Organization of the first Autumn School on Nano-Bioengineering



- The Autumn School on Nano-Bioengineering was organised in Chisinau, Moldova during September 14-17, 2019.
- 33 participants attended the 24 hours of the Autumn School.
- The program of the Autumn School included lectures delivered by professors and researchers from partner organizations, such as: Hannover Medical School - MHH (Germany), University of Bristol - UNIVBRIS (UK), Technical University of Moldova - TUM, State Medical and Pharmaceutical University "N. Testemitanu", Academy of Sciences of Moldova - ASM and also by two professors from the Shizuoka University, Japan
- After the end of the Autumn School the attendees participated in the 4th International Conference on Nanotechnologies and Biomedical Engineering ICNBME (<https://icnbme.sibm.md>) and were awarded certificates of participation in the Autumn School



Expert staff visits

- Experts from partner institutions visited NCMST.
 1. Dr. Andrei Sarua (16-21 September 2019) & Dr., Assoc. Prof. Annela Seddon (13 -15 September 2019), University of Bristol
 2. Dr. Andres Hilfiker, Dr. Serghei Cebotari, Dr. Igor Tudorache, Prof. Axel Haverich (15-20 September 2019), MHH
 3. Prof. Jan Linnros and Dr. Apurba Dev from KTH visited NCMST in February 2020
 4. **Further visits were postponed due to COVID-19 pandemics**



Output: The experts presented lectures to the students at summer school, attended the ICNBE conference, visited NCMST laboratories and had discussions with research staff, where they also met the students selected to visit their institutions.



Expert staff visits

- NCMST expert staff visits have been carried out to partner institutions.
 1. Dr. Tudor Braniste, TUM (24-31 October 2019) to UNIVBRIS, UK
 2. Dr. Tudor Braniste, TUM (10-17 November 2019) to JRC, Italy
 3. Dr. hab. Veaceslav Ursachi and dr. Tudor Braniste, TUM (16-19 December 2019) to KTH, Sweden
 4. Prof. Viorel Nacu, SUMPPh (24-29 February 2020) to MHH, Germany
 5. **Further visits were stopped due to COVID-19 pandemics**

Output:

- Trainings on nanomaterials characterization (XRD, XPS, AF4), water decontamination technologies at KTH, fabrication process of nanobiosensors, etc.



All the short term expert visits have been postponed during the COVID-19 Pandemics

ONLINE Expert Staff Training on Commercialization of Research Results and Technologies

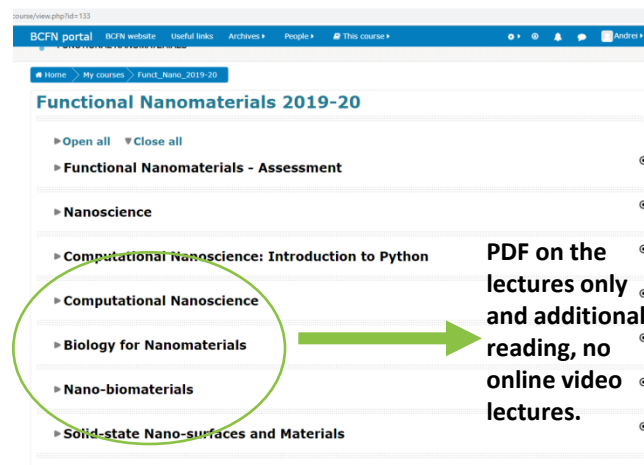
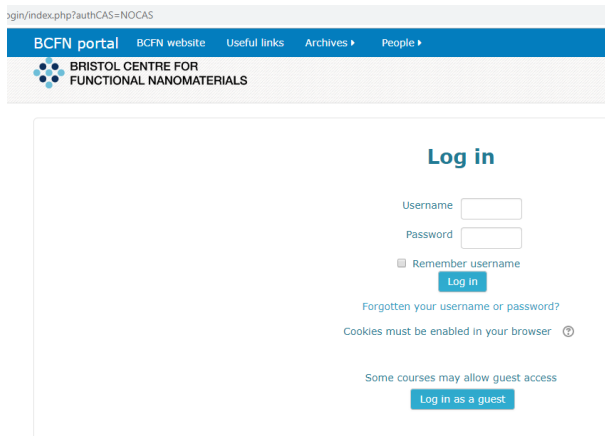


- On the 28th of October, a group of 18 researchers from Moldova involved in the implementation of NanoMedTwin project participated in an online meeting with experts in Intellectual Property and Transfer of Technology from the University of Bristol.
- The lecture was given by Dr. James Hamilton from Research and Enterprise Development at University of Bristol, who discussed with the Moldovan team the most important tips on commercialisation of research results and technologies. Among the listeners there were researchers from the Technical University of Moldova, State University of Medicine and Pharmacy, and „Eliri” Research Institute.

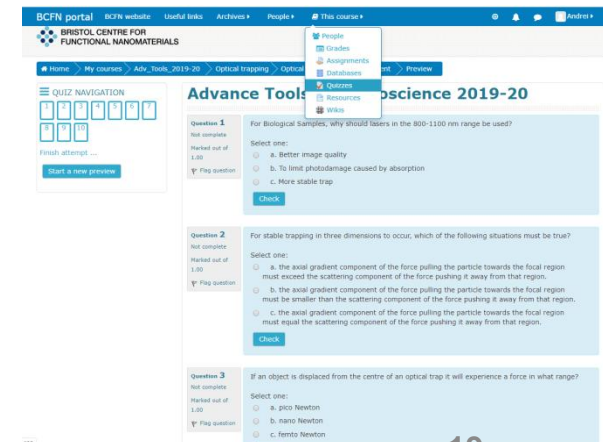
A screenshot of a Zoom meeting interface. The top bar shows the time as 00:16:03 and a "View" button. The main area is a grid of 15 video thumbnails. The top row shows five participants: Andrei Sarua, Tudor Braniste, Ion Tiginyanu, James (highlighted with a yellow border), and ursaki. Below the thumbnails are names: Iulia Veremiov, Mihai ENACHI, Iriny Plesco, Magariu Nicolae, and Monaico Eduard. The second row shows: Margareta Iachi..., Vladimir Ciobanu, V.Popa, Alexandrina Tu..., and Dumitru. The third row shows: Marcel Varlan (with a purple 'M' icon), Vitalie Cobzac, Andrei Tiron, Malcova Tatiana, and Alina Stoian. On the right side, a presentation slide is displayed. The slide has the University of Bristol logo at the top left and a photograph of a city. The main text on the slide reads: "Intellectual property (IP), commercialisation, licencing, spin outs and all that?". Below the text is a small image of hands holding a glowing sphere. At the bottom right of the slide, there are two smaller video thumbnails showing a meeting room with a projector screen and several people seated around a table.

Functional Nanomaterials Online training

- UNIVBRIS with partnership of Bristol Center for Functional Nanomaterials (BCFN) (<https://www.bristol.ac.uk/physics/functional-nanomaterials/>) has made available access to the online training portal (<https://portal.bcfm.bris.ac.uk//portal/login/index.php>), which includes courses and assessments in Functional Nanomaterials for MSc and PhD students in form of slides, online recordings, and online tests.
- More than 20 students from Moldova have been granted access to this extensive training resource.



PDF on the lectures only and additional reading, no online video lectures.



Workshops on Framework Program (H2020 and future FP9) proposal preparation and project implementation



- The first 3-day Horizon 2020 Proposal Writing workshop took place on 11-13 April 2019, with over 30 researchers.
- The workshop contained presentations and exercises including a mock proposal exercise and budgeting exercise, and generated much discussion and interaction with the audience
- The second 3-day Horizon 2020 Proposal Writing workshop took place on 23-25 September 2019, with over 30 researchers
- The workshop contained presentations and exercises including an abstract writing exercise, a mock proposal exercise, budgeting exercise, person-month rate exercise and generated much discussion and interaction with the audience.



Publications



1. Tiginyanu, I., Braniste, T., Smazna, D., Deng, M., Schutt, F., Schuchardt, A., Stevens-Kalceff, M. A., Raevschi, S., Schurmann, U., Kienle, L., Pugno, N. M., Mishra, Y. K., Adelung, R. (2019): Self-organized and self-propelled aero-GaN with dual hydrophilichydrophobic behaviour. **Nano Energy** (IF=15.54)
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3. Dragoman, M., Ciobanu, V., Shree, S., Dragoman, D., Braniste, T., Raevschi, S., Dinescu, A., Sarua, A., Mishra, Y. K., Pugno, N., Adelung, R. and Tiginyanu, I. (2019), [Sensing up to 40 atm Using Pressure-Sensitive Aero-GaN](#). **Phys. Status Solidi RRL** (IF=3.72)
4. Dragoman, M., Braniste, T., Iordanescu, S., Aldrigo, M., Raevschi, S., Shree, S., Adelung, R. and Tiginyanu, I. (2019), Electromagnetic interference shielding in X band with aero-GaN. **Nanotechnology** (IF=3.39)
5. Braniste, T., Zhukov, S., Dragoman, M., Alyabyeva, L., Ciobanu, V., Aldrigo, M., Dragoman, D., Iordanescu, S., Shree, S., Raevschi, S., Adelung, R., Gorshunov, B., Tiginyanu, I. (2019), [Terahertz shielding properties of aero-GaN](#). **Semiconductor Science and Technology** (IF=2.65)
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8. MORARI, Vadim; URSAKI, Veacheslav; RUSU, Emil; TIGINYANU, Ion. [Injection photodiodes based on metal oxide semiconductors](#). In: *Moldavian Journal of the Physical Sciences*. 2020, nr. 1-2(19), pp. 98-109. ISSN 1810-648X.
9. Sprincean, V., Lupan, O., Caraman, I., Untila, D., Postica, V., Cojocar, A., Gapeeva, A., Palachi, L., Adelung, R., Tiginyanu, I., Caraman, M. [Crystallinity and optical properties of \$\beta\$ -Ga₂O₃/Ga₂S₃ layered structure obtained by thermal annealing of Ga₂S₃ semiconductor](#). *Materials Science in Semiconductor Processing*, Volume 121, **2021**, 105314, ISSN 1369-8001.
10. Monaico, E.V.; Monaico, E.I.; Ursaki, V. V.; Tiginyanu, I. M. [Free-Standing Large-Area Nanoperforated Gold Membranes Fabricated by Hopping Electrodeposition](#). *ECS Journal of Solid State Science and Technology*. **2020**, 9.
11. Zalamai, V.; Syrbu, N.; Stamov, I.; Beril, S. [Wannier–Mott excitons in GaSe single crystals](#). *Journal of Optics*. **2020**, 22.
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15. Braniste, T.; Dragoman, M.; Zhukov, S.; Aldrigo, M.; Ciobanu, V.; Iordanescu, S.; Alyabyeva, L.; Fumagalli, F.; Ceccone, G.; Raevschi, S.; Schütt, F.; Adelung, R.; Colpo, P.; Gorshunov, B.; Tiginyanu, I. [Aero-Ga₂O₃ Nanomaterial Electromagnetically Transparent from Microwaves to Terahertz for Internet of Things Applications](#). *Nanomaterials* **2020**, 10, 1047.
16. Monaico, E., Tiginyanu, I., Ursaki, V. (2020), [Porous semiconductor compounds](#). *Semiconductor Science and Technology*.

Communication activities



- The **IVth edition of the International Conference on Nanotechnologies and Biomedical Engineering (ICNBME-2019)** was hosted by the Republic of Moldova during 18-21 September 2019.
- The conference gathered about 200 participants, among them 70 prominent scientists from 20 countries, like Germany, France, the USA, Japan, Greece, Romania, Russian Federation, Belarus, Armenia, Georgia, Ukraine etc.
- The conference has been streamed online and the video is available at <http://nanomedtwin.eu/en/icnbme-2019-conference-impact>
- Proceedings of the ICNBME-2019 were published by Springer and are available online at <https://www.springer.com/gp/book/9783030318659>, thus ensuring global visibility of the research achievements



- The Vth edition of the International Conference on Nanotechnologies and Biomedical Engineering will be held **ONLINE** in October 2021
- Second Autumn School on Nano-Bioengineering
- Student and expert visits

Thank You
for your kind attention!