

Development of nanotechnologies at the Technical University of Moldova between 2001-2024

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Abstract. The New Nanotechnology Initiative promoted in the USA at the very beginning of the XXI Century had a strong impact on the development of nanotechnologies in the whole world. Being in 2001 at the University of Michigan in Ann Arbor, I witnessed the process of launching the new initiative. Moreover, in autumn 2002 I attended the Conference organized by the European Commission to launch the EU 6th Framework Programme which had nanotechnologies as an important component. Being impressed by the decision of the authorities in the USA and the European Commission to invest in the development of nanotechnologies, we decided to create a nanotechnological infrastructure at the Technical University of Moldova. We started with the purchase of a Scanning Electron Microscope, an Atomic Force Microscope, equipment for the deposition of thin layers by sputtering as well as of equipment for electrochemical etching and deposition of electronic materials. The nanotechnological infrastructure served as the basis for the creation of the National Center for Materials Study and Testing (NCMST) (<https://ncmst.utm.md/en>). The first collaborators of the NCMST were graduates Veaceslav Popa and Eduard Monaico who contributed much to the successful realization of the first projects on nanotechnologies and nanomaterials. In 2005 our research group got an Award of Excellence at an International Exhibition on New Technologies and Products held in Pittsburgh, USA, for the invention of the so-called *Surface Charge Lithography* which enabled one to create various nanostructures and ultrathin membranes based on GaN and other binary semiconductor compounds. Subsequently we succeeded in the fabrication of

single crystals of pores, membranes consisting of networks of ordered nanotubes, two-dimensional metal-semiconductor photonic crystals etc. *Hopping electrodeposition* developed at the NCMST allowed one to cover complicated surfaces of semiconductor materials by a monolayer of metal nanodots. Later on, our research group succeeded in developing hollow nanoparticles and three-dimensional nanoarchitectures based on GaN for multifunctional applications, including applications in microfluidics and biomedicine. The first artificial material exhibiting dual hydrophobic-hydrophilic properties has been invented, a fascinating result highlighted by Physics World (<https://physicsworld.com/a/hydrophobic-or-hydrophilic-aero-gallium-nitride-is-both/>). Over the years, we implemented important projects, including ones financially supported by the European Commission under the 7th EU Framework Programme and Horizon-2020 Programme. In the frame of these projects, many dozens of students have been trained at the NCMST as well as in a number of prestigious foreign research institutes and partner universities, including Royal Institute of Technology (Stockholm, Sweden), Joint Research Centre (Ispra, Italy), Bristol University (UK), Kiel University (Germany) etc. The infrastructure of the NCMST enabled 12 young researchers to defend their PhD theses in the field of nanotechnologies and nanomaterials, while one of them succeeded in defending the Doctor habilitate thesis as well. In the presentation, there will also be highlighted the achievements of other research groups of the Technical University implementing projects related to the field of nanotechnology.