



SPINTECH in its second year

The SPINTECH project continues focus on building its research excellence in superconducting spintronics into Year 2. The consortium, comprised of D. GHITU Institutul de Inginerie Electronica și Nanotehnologii and its high-experienced Twinning partners: Stockholms Universitet in Sweden (SU) and Universiteit Twente in the Netherlands (UTWENTE), have been busy completing their staff-exchanges and attending workshops, conferences and summer schools in the framework of the project. Through these planned events, the partners have focused their efforts on two main sub-topics: Advanced vacuum technologies development for fabrication of layered nanostructures for spintronics, and Elaboration and testing of a superconducting spin-valve for switching and memory elements.

This second newsletter provides more information on the future of and accomplishments achieved within the SPINTECH project so far. It delivers better insight on the research and innovation activities which contribute to SPINTECH raising the research profile of its consortium and supporting science on a national and European level in spintronics.

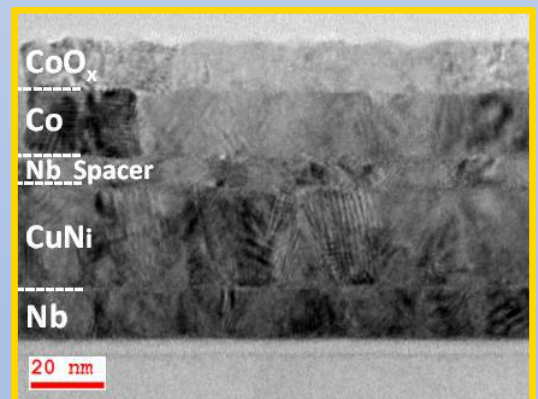


What is Spintronics?

Spintronics is a new field of research and engineering exploiting the influence of intrinsic electron spin on electrical transport. It is a rapidly developing area that allows insight into fundamental spin-dependent physical properties and exponentially expanding practical applications — such as the read head sensors for hard drives and memory elements for computers.

One of the main challenges in this field is the realization of spintronics based devices; in particular, there is intense research activity focused on combining superconductivity and spintronics, to enhance device functionality and performance. In this framework, strengthening IEEN's research excellence in superconducting spintronics will be achieved by focusing efforts on two sub-topics with the support of the Twinning partners:

- Advanced vacuum technologies development for fabrication of layered nanostructures for spintronics (IEEN and University of Stockholm), and
- Elaboration and testing of a superconducting spin-valve for switching and memory elements (IEEN and University of Twente)



Triplet spin valve nanostructures (layered hybrid structure); from bottom to top: Nb (Superconductor) / CuNi (Ferromagnet - 1) / Nb (Spacer) / Co (Ferromagnet - 2) / CoOx (Antiferromagnet).



SPINTECH workshops

Following the success of their initial workshop in Chisinau (MD) on March 5th, 2019, the partners organised two additional events in the context of SPINTECH with a diverse set of training modules.

The second training workshop was hosted by Stockholm University (Sweden) on June 14th, 2019. During this event, project members presented their most recent research related to ion beam photolithography, Bi wires and nanostructure fabrication. Technical presentations were given by both IEEN and SU members:



Prof. Vladimir Krasnov presenting high-level resolution technique - Ion Beam Photolithography

- Information about staff exchange between IEEN and SU, scientific equipment, available for research (Vladimir Krasnov)
- Ion beam photolithography –the powerful instrument for nanostructuring (Taras Golod)
- Advanced methods of nanostructures fabrication. (Anatolie Sidorenko)
- Bi wires: properties in high magnetic field and under deformation. (Elena Condrea)
- Preparation and investigation of functional nanostructures from SF-layered hybrids. (Roman Morari)

The third SPINTECH training workshop took place in Enschede (NL) on August 27th, 2019 on UTWENTE's premises. During the workshop, project partners presented their most recent research related to the investigation of magnetic properties of SF-hybrid nanostructures. The following training lectures were given to the participants:

- Information about staff exchange between IEEN and UTWENTE and scientific equipment available for research (Alexander Golubov)
- SQUID-Microscope: the powerful instrument for magnetic nanostructures investigation (Pim Reith)
- Methods of critical magnetic fields investigation. (Anatolie Sidorenko)
- Critical magnetic fields calculation for layered SF-nanostructures. (Evghenii Antropov)
- Proximity effect peculiarities in SF-layered hybrids. (Alexander Golubov)

The programmes for all workshops are available on the project website here: [\(1\)](#) and [\(2\)](#)

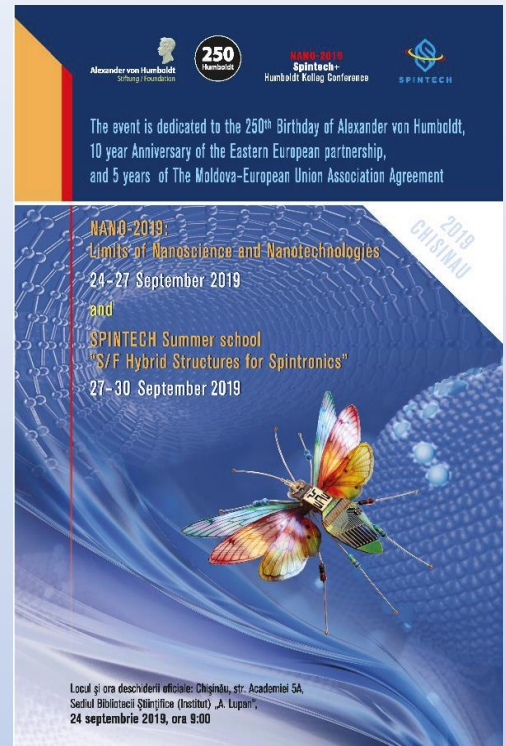


1st SPINTECH International Conference

The SPINTECH consortium organised “SPINTECH-NANO-2019: Limits of Nanoscience and Nanotechnologies” in Chişinău from September 24th – 27th, 2019. This exciting event featured a comprehensive scientific and cultural agenda with +130 international participants in attendance. The central goal of the Conference was bring together professors, lectures, researchers, students and PhD-students from various universities and institutes, working in an intensive cooperation to share their experience, new ideas and different forms of collaboration for organization of modern forms of research and education.

The programme consisted of well-known invited experts and the SPINTECH consortium providing lectures, and poster sessions for young researchers to showcase their work and to receive feedback from experienced scientists.

The complete schedule for SPINTECH-NANO-2019 is available [here](#)>



1st SPINTECH Summer School



SPINTECH Summer school lecture sessions

The first SPINTECH Summer School “S/F Hybrid Structures for Spintronics” was held from 27-30 September 2019, following the completion of the international conference. It covered the latest science and innovation issues in the field of spintronics by focusing on the following topic: “Advanced technologies in functional nanostructures fabrication”. The event was hosted by D GHITU IE and was attended by at least 30 young researchers, as well as experienced researchers and staff. DGHITU IE primarily presented their work in the field of thin films and vacuum technology, including advanced technology and know-how (patented) techniques for fabrication of functional nano-structures.





Presenting SPINTECH at scientific events

During the first half of the project, the SPINTECH partners from Moldova, Sweden and the Netherlands have been busy presenting their work at a variety of international scientific conferences, seminars and lectures. They have attended the following events:



Prof. A. Sidorenko in Zürich

- Tunneling through Nanoscience (TTN) 2018 International Conference (Ravello, IT): i) Direct Evidence of Proximity Induced Abrikosov Vortex Core in a Nonsuperconducting Metal; ii) Static and dynamic properties of Josephson junctions with thin superconducting layer inside the weak link
- BIT's Annual World Congress of Nano S&T 2018 (Postdam, DE): Functional Nanostructures for Superconducting Spintronics
- 82nd Topological Materials Science Seminar (Kyoto, JP): Expansion of a superconducting vortex core into a diffusive metal
- Plasma 2019 Workshop (FI, US): Boson emission up to 13 THz from small Bi₂Sr₂CaCu₂O_{8+δ} mesa structures
- Biomedical Engineering 2019 (Haifa, IL): "The Engine of Growth for a Better Life"
- XXIII symposium on Nanophysics and Nanoelectronics (Nizhny Novgorod, RU): Profound surface superconductivity in conventional and unconventional superconductors, single crystals and thin films
- World Chemistry Forum 2019 (Barcelona, ES)

- 30th World Nano Conference - Invention and Innovation of New Concepts in the Field of Nanotechnology (Zurich, CH)
- XVII International Workshop on Vortex Matter in Superconductors (Antwerp, BE)
- International conference "SPINTECH-NANO-2019: Limits of Nanoscience and Nanotechnologies"



Upcoming Events

The second SPINTECH Summer School will be hosted by UTWENTE (NL) in July 2020. This event is foreseen to focus on Hybrid Structures for Spintronics and Qubits and will feature a variety of scientific lectures from well-respected experts in the field.

For more information regarding SPINTECH's activities, please visit the project website:



Contact

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<https://www.researchgate.net/project/SPINTECH-superconducting-spintronics>



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