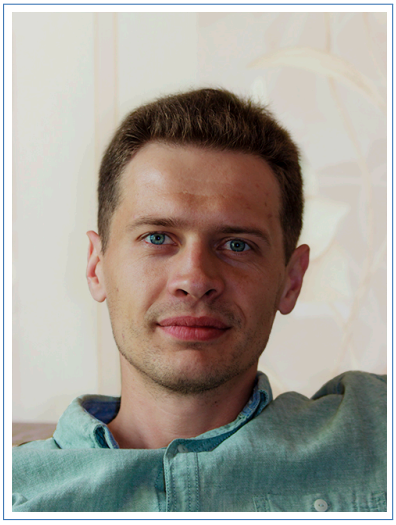

Dmytro POLISHCHUK

Research Scientist, PhD in Physics

Curriculum Vitae

Personal Data and Contacts

Birth date	1988, November 6
Nationality	Ukrainian
Family	Married, 1 child
Address	Yablonska 1, apt. 160, Kyiv, Ukraine (*Home*)
Address	Sveavägen 164, apt. A11, 113 46, Stockholm, Sweden (*Current*)
E-mail	dpol@kth.se

Background and objectives

My field of expertise is magnetism of nanostructures and devices. Currently my research is focused on designing magnetic nanostructures with new functionalities promising for applications in spin-electronics. This requires extensive use of the state-of-the-art nanofabrication methods (deposition of ultra-thin-film multilayers, photo- and electron-beam lithography, focused ion beam) and sensitive experimental characterization techniques (VSM and Kerr magnetometry, magneto-transport measurements, ferromagnetic resonance, etc.). Some of my recent results are demonstration of temperature-dependent indirect (RKKY) and direct exchange interactions in transition-metal magnetic multilayers, aimed at novel thermomagnetic applications in thermionics and magnetocalorics. I am also active in spin dynamics in magnetic multilayers, which incorporate conventional and synthetic ferro-, ferri- and antiferromagnet materials. I have had a leading role in the above projects contributing to the entire effort, from generating ideas to material or device fabrication, measurements, analysis, and publication. The most fascinating part to me is brainstorming new ideas and their experimental implementation, which requires constant learning of new techniques and methods as well as communication with other experts in the field worldwide.

Education

2012–2015 **PhD in Physics**, *Institute of Magnetism, National Academy of Science of Ukraine (NASU)*, Kyiv, Ukraine.

PhD thesis title: *Magnetic and resonance properties of inhomogeneous macro- and nanomagnets on the basis of manganese and iron.*

Description: The thesis investigates macro- and nanoscaled systems in dependence on their structural and morphological inhomogeneity. The work concerns the experimental investigation of magnetic properties of a variety of magnetic material systems: polycrystalline manganites $La_{2/3}Ba_{1/3}MnO_3$, colossal-magnetoresistance (La,Na)MnO_3 thin films and planar arrays of Fe nanowires. The experimental techniques used include electron spin resonance, magneto-transport measurements, vibrating-sample magnetometry, X-ray diffractometry, magnetic force microscopy, etc. The experimental results are validated by phenomenological and extensive numerical simulations.

2006–2012 **Master of Science in Physics *(With distinction)***, *National Technical University of Ukraine "Igor Sikorsky Kyiv Politechnic Institute" (www.kpi.ua), The Faculty of Physics and Mathematics*, Kyiv, Ukraine.

Specialization: *General and experimental physics.*

Master thesis title: *Phase separation in polycrystalline $La_{2/3}Ba_{1/3}MnO_3$ and heterophase thin films (La,Na)MnO_3/$LaAlO_3$ (001): ESR study.*

Professional Experience

2010–pres. **Senior Research Scientist (2016-present), Research Scientist (2012-2016), Engineer (2010-2012)**, *Institute of Magnetism, NASU*, Kyiv, Ukraine.

- Ferromagnetic resonance of complex-oxide magnetic materials (bulk composites and thin films) and transition-metal nanostructures (multilayers, arrays of nanowires, etc.).
- Spin-transport, resonance and magneto-electric experiments in complex-oxide and multiferroic hetero-structures.
- Phenomenological simulations: ferromagnetic resonance in thin films and multilayers; temperature-dependent hysteresis loops of nanoparticle ensembles.

2015–2018 **Postdoctoral researcher, Parental leave (May 2017 - Feb. 2018)**, *Royal Institute of Technology KTH*, Stockholm, Sweden.

- Spin-thermionics and magnetocalorics in multilayers and nanodevices.
- Engineering of temperature-controlled indirect and direct exchange interaction in magnetic multilayers.
- Nanofabrication: magnetron sputtering, lithography.
- Experimental characterization: vibrating-sample and magneto-optic magnetometry, magneto-transport measurements, ferromagnetic resonance.

2012–2014 **Teacher of Physics**, *Secondary School*, Kyiv, Ukraine.

Awards

2014 Prize of the President of Ukraine for young scientists.

2013 Participation Grant of FP7 Nanotwinning project to take part in the 2nd International Summer School for young scientists "NANO-2013" (*Bukovel, Ukraine*).

2012–2013 Fellowship of Zavtra.UA scholarship program for talented students by the Victor Pinchuk foundation.

2012 Diploma for the best oral report among young scientists at the International conference "CMMT-2012" (*Kyiv, Ukraine*).

Primary Scientific and Technical Interests

- Magnetism of nanoscaled systems; spintronics.
- Spin dynamics in magnetic nanostructures.
- Spin-thermionic and magnetocaloric properties of transition-metal nanostructures.
- Nanofabrication methods: thin film deposition, lithography.
- Characterization techniques: magnetic-resonance and spin-transport measurements.

Skills and Techniques

- ***Magnetic characterization:*** Ferromagnetic resonance, magneto-transport measurements, VSM magnetometry, magneto-optical Kerr-effect (MOKE) magnetometry (polarization modulation, PEM).
- ***Nanofabrication:*** Magnetron sputtering (incl. reactive and co-deposition), optical and electron-beam lithography, cryogenic mechanical and reactive etching, etc.
- ***Morphological characterization:*** SEM/FIB microscopy, atomic (magnetic) force microscopy, etc.
- ***Computer simulations:*** Phenomenological calculations of ferromagnetic resonance and magnetic hysteresis, finite element method simulations, etc.

Participation in International projects

2014–2017 Spin-thermo-electronics, *Science and Technology Center in Ukraine (STCU)*.

2013–2014 Nanostructured left-handed media and magnetotunable elements on their basis for applications in EHF band, *STCU*.

Publications and Conferences

20 published papers (7 papers in 2017) & 17 conference presentations

Selected papers:

- D. M. Polishchuk, Yu. O. Tykhonenko-Polishchuk, E. Holmgren, A. F. Kravets, and V. Korenivski, *Thermally induced antiferromagnetic exchange in magnetic multilayers*, Phys. Rev. B **96**, 104427 (2017).
- D. M. Polishchuk, Yu. O. Tykhonenko-Polishchuk, A. F. Kravets, and V. Korenivski, *Thermal switching of indirect interlayer exchange in magnetic multilayers*, EPL **118**, 37006 (2017).
- A. F. Kravets, D. M. Polishchuk, V. A. Pashchenko, A. I. Tovstolytkin, V. Korenivski, *Current-driven thermo-magnetic switching in magnetic tunnel junctions*, Appl. Phys. Lett. **111**, 262401 (2017).
- A. F. Kravets, D. M. Polishchuk, Yu. I. Dzhezherya, A. I. Tovstolytkin, V. O. Golub, and V. Korenivski, *Anisotropic magnetization relaxation in ferromagnetic multilayers with variable interlayer exchange coupling*, Phys. Rev. B **94**, 064429 (2016).
- A. F. Kravets, A. I. Tovstolytkin, Yu. I. Dzhezherya, D. M. Polishchuk, I. M. Kozak, and V. Korenivski, *Spin dynamics in a Curie-switch*, J. Phys.: Condens. Matter. **27**, 446003 (2015).
- S. K. Arora, B. J. O'Dowd, D. M. Polishchuk, A. I. Tovstolytkin, P. Thakur, N. B. Brookes, B. Ballesteros, P. Gambardella, and I. V. Shvets, *Observation of out-of-plane unidirectional anisotropy in MgO-capped planar nanowire arrays of Fe*, J. Appl. Phys. **114**, 133903 (2013).

- D. M. Polishchuk, A. I. Tovstolytkin, E. Fertman, V. Desnenko, A. Beznosov, M. Kajnakova, A. Feher, *Structural first-order transformation in $La_{2/3}Ba_{1/3}MnO_3$: ESR study,* J. Magn. Magn. Mater. **324**, 4225 (2012).

Computer skills

Languages	Wolfram Mathematica, Python
OS	Windows
Tools	LabView, OriginPro, Adobe Photoshop & Illustrator, MS Office, LaTeX

Languages

Ukrainian	Fluent	*My first native language.*
Russian	Fluent	*My second native language.*
English	Fluent	*Used for work, publications and presentations.*

Interests

Popular science	Sustainable development, astrophysics, etc.
Photography	Landscape, nature.
Sport	Football, tennis, bicycle.

Dmytro Polishchuk *May 18, 2018*