

Irina Sharai

Research Scientist, PhD in Physics



Curriculum Vitae

Personal Data and Contacts

Birth date 1978, December 2

Nationality Ukrainian

Family Married, 2 child

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Background and objectives

My field of expertise is magnetism of nanostructures. Currently my research is focused on designing magnetic nanostructures with new functionalities. Some of my recent results are the study of influence of structural inhomogeneities on the surface of the magnetic films on their magnetic and optical properties. The investigations of ultra-thin magnetic films layers of bismuth-substituted ferrite garnets and one-dimensional magnetophotonic crystals were performed. It was found that a high-energy ion treatment of substrates surface leads to the formation of a transitional layer on the boundary between substrate and film with a smooth change of composition that enables to control the magnitude of magneto-optical effects in such films. This changes the compensation point of the magnetic sample, as well as magnitude and sign of magneto-optical effect. It was experimentally demonstrated that the effectiveness of recrystallization and the roughness of NiFe films surface when irradiated by nanosecond laser pulses depends on the laser radiation wavelength. For the first time, the method of managing of high-frequency magnetic susceptibility of magnetic nanoparticles by using an external constant magnetic field for their heating by an alternating magnetic field was developed. It was shown that varying the magnitude and direction of the constant magnetic field, we can change the values of high-frequency magnetic susceptibility by dozen times. The phenomenon of nonlinear dependence of magnetic permeability on the magnetic field was proposed to use for the creation of high-sensitive compact flux-gate magnetic field sensors with parametric amplification of signals. The methods of creation of high-gradient magnetic fields with a given configuration using structured substrates were proposed.

Education

1996–2002 **bachelor and specialist student**, National Technical University of Ukraine "Kyiv Politechnic Institute" (www.kpi.ua), The Faculty of Physics and Mathematics, Kyiv, Ukraine.

Specialization: Physics.

Specialist thesis title: Hydrolized silicon oxide thin films optical studies

2009–2012 **PhD in Physics**, *Institute of Magnetism, NAS of Ukraine and MES of Ukraine*

Kyiv, Ukraine.

PhD thesis title: *Influence of structural inhomogeneities on the surface of the magnetic films on their magnetic and optical properties.*

Professional Experience

Institute of Magnetism, NAS of Ukraine and MES of Ukraine

**Senior Research Scientist (2017-present),
Research Scientist (2016-2017),
Junior researcher (2012-2016)**

Awards

2011 Diploma for the best poster report among young scientists at the International conference

"ICFM-2013" (*Partenit, Crimea*).

2009–2010 Fellowship of Presidium NAS of Ukraine for young scientists

Primary Scientific and Technical Interests

- study of nanostructures and nanomaterials;
- analysis of physical models and experimental studies of characteristics and properties of nanostructures;
- study of the influence of structural inhomogeneities on magnetic, magneto-optical and electrical characteristics of thin films and fine-dispersed materials.

Skills and Techniques

- Morphological characterization: atomic (magnetic) force microscopy;
- **Magnetic characterization:** magneto-optical Kerr-effect, measurements of magnetic susceptibility by resonance methods;

Participation in International projects

2013–2014 *Development and optimization of technology for obtaining magneto rigid and magnet soft materials for magnetoplast (STCU).*

Publications and Conferences

12 published papers, 3 invention patent, 27 conference presentations

Selected papers:

- Shaposhnikov A.N. Modification of Bi:YIG film properties by substrate surface ion pre-treatment / A.N.Shaposhnikov, A.R. Prokopov, A.V. Karavainikov, V.N. Berzhansky, T.V. Mikhailova, V.A. Kotov, D.E. Balabanov, I.V. Sharay, O.Y. Salyuk, M. Vasiliev, V.O. Golub // *Materials Research Bulletin*. – 2014. – vol.55. – P. 19–25.
- Shaposhnikov A.N. Surface Properties of Nanoscale Iron Garnet Films / T.B. Kosykh, A.S. Prosyakov, A.P. Pyatakov, A.N. Shaposhnikov, A.R. Prokopov, I.V. Sharay // *Solid State Phenomena*. – 2015. – Vols. 233-234. – P. 678-681.
- M.M. Krupa. *Magnetic field sensors based on the foil of amorphous cobalt alloy and NiMnGa martensite single-crystals* / Yu.B. Skirta, I.V. Gerasimchuk, I.V. Sharay // *Sensors and Actuators A: Physical*. – 2017. – V.264. – P.165-171.
- Ignatyeva T.A. Perspectives of constant gradient magnetic fields applications in biotechnology / T.A. Ignatyeva, V.N. Voyevodin, A.N. Goltsev, V.V. Kiroshka, A.M. Bovda, V.V. Kalynovskii, A.N. Velikodny, P.A. Kutsenko, V.O. Golub, Yu.I. Dzhezheria, I.V. Sharai // *American Journal of Bioscience and Bioengineering*. – 2014. – vol.2. – №6. – P. 72-77

