Curriculum Vitae

Mr. Alexander Omelyanchik

Laboratory of Novel Magnetic Materials,
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Immanuel Kant Baltic Federal University.

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Date of Birth: [redacted]
Place of Birth: [redacted]

Employment experience

Aug. 2015 – present — IKBFU, Laboratory of Novel Magnetic Materials lead by Dr. Valeria Rodionova, *Young Researcher.*

Sep. 2019 – present — Department of Chemistry and Industrial Chemistry, University of Genova, *PhD research scholarships* under "Synthesis and crystallographic and magnetic characterization of high magnetic density Fe-N superstructures" project lead by Prof. Fabio Canepa and Prof. Davide Peddis.

Education

Aug. 2016 – present — IKBFU, Institute of Physics, Mathematics and Information Technology, *PhD-student*, supervisor Dr. Valeria Rodinova, co-supervisor Prof. Davide Peddis
Thesis: "Magnetic anisotropy of oxides nanoparticles: influence of chemical composition and morphology"
(estimated time of graduation is the end of 2020 / beginning of 2021);

2007–2012 — IKBFU, Physics & Technology Institute, Department of Radiophysics with the degree of "specialist of radiophysics and electronics" *(equal to master-degree).*
Thesis: "Investigation of the transmission path of lines of leaky waves with the lumped parameter"

Honors

Mar. 2021 — Honorable Mention with the Poster Presentation entitled "Effect of ultrathin shell in $CoFe_2O_4/NiFe_2O_4$ and $CoFe_2O_4/NiO$ core/shell nanoparticles on magnetic properties" at 4a Jornada Francisco Tourinho conference (Brasilia, Brasil);

Mar. 2019 — Outstanding Reviewer Award winners for 2018, in recognition of the high quality and timeliness of your reviews for Nanotechnology;

Oct. 2018 — Best poster presentation award on IEEE International Conference on "Nanomaterials Applications & Properties" work entitled "Study of magnetic behavior of magnetite nanoparticles dispersed in fluid" (Zatoka, Ukraine);

Nov. 2017 — Best oral presentation among young researchers on "Magnetic nanomaterials for biomedicine: synthesis, properties, application" (Moscow, Russia);

Nov. 2017	Scholarship from Interdisciplinary Reference Centre: Functionalized Magnetic Materials for Energy and Biomedical Applications (Kaliningrad, Russia).
Organizing work August 18–22, 2019 Svetlogorsk, Russia	IBCM_2019 International Baltic Conference on Magnetism: Focus on nanobiomedicine and smart materials, *Member of organizing committee;*
July 2–6, 2018 Rome, Italy	ISMANAM_2018 The 25th International Symposium on Metastable, Amorphous and Nanostructured Materials, *Member of organizing committee;*
Aug. 20–24, 2017 Svetlogorsk, Russia	IBCM_2017 International Baltic Conference on Magnetism: Focus on functionalized magnetic structures for energy and biotechnology, *Member of organizing committee;*
Aug. 30–Sep. 3, 2015 Svetlogorsk, Russia	IBCM_2015 International Baltic Conference on Magnetism: Focus on Biomedical Aspects, *Member of organizing committee.*
Internships Sep. 24–Oct. 1, 2016	Resource Centre Electrophysical methods, NRC Kurchatov Institute (Moscow, Russia) under the supervision of PhD Andrey Emelyanov;
Dec. 13–19, 2016	Laboratory of Pulse Processes, Institute of Electrophysics (Yekaterinburg, Russia) under the supervision of PhD Igor Beketov;
Regular visits during 2015–2020 (total time ~2 years)	Nanostructured Magnetic Materials group of Institute of Material Structure / CNR (Rome, Italy) and Department of Chemistry and Industrial Chemistry, University of Genova (Genova, Italy) under the supervision of Prof. Davide Peddis.
Grants 2021–2024 *member of the team*	"Development and investigation of multimaterials with magnetic nanoinclusions for additive 3d-5d technologies" Russian Science Foundation (RSF); № 21-72-30032
2021–2024 *principal investigator*	"Development of mesoscale hybrid magnetic particles for biomedical applications" Russian Science Foundation (RSF); № 21-72-20158
2019–2021 *member of the team*	"Complex research of the magnetoelectric effect in in the developed and created triplee-component elastomers for their application for use as active biological interfaces" Russian Foundation for Basic Research in the frame of project мол_а_вед; № 18-32-20219
2018–2019 *principal investigator*	"Investigation of the interrelation between the magnetic interaction of ferromagnetic nanoparticles in exchange-coupled multifunctional nanocomposites with different types of magnetic ordering of the ferroelectric components" - Russian Foundation for Basic Research in the frame of "my first grant" project (мол_а); №18-32- 01016
Jan. 30 – June 30, 2018 *mobility grant*	Russian Foundation for Basic Research in the program "Mobility of young scientists" under the supervision of Prof. Alexander Majouga from MSU (Moscow, Russia); №17-32-50202
Oct. 15 – Dec. 15, 2016 *mobility grant*	Russian Foundation for Basic Research in the program "Mobility of young scientists" under the supervision of PhD Alexander Inyushkin from NRC

Kurchatov Institute (Moscow, Russia);
№16-32-50187

Oct. 17 – Dec. 10, 2016
principal investigator

Interdisciplinary Reference Centre: Functionalized Magnetic Materials for Energy and Biomedical Applications under the supervision of PhD Valeria Rodionova;

2017–2019
member of the team

"Physics fundamentals for the creation of electromagnetic actuators based on microwires", Russian Scientific Foundation,
№17-12-01569;

2017–2019
member of the team

"Trapping, pinning and injecting of domain wall in wire with cylindrical symmetry with diameters from submicron to few microns and control of domain wall propagation dynamics", Ministry of Education and Science of the Russian Federation in the framework of government assignment,
№3.4168.2017/ПЧ.

Experience
Equipment:

Vibrating Sample Magnetometer (7400 System, Lakeshore);
Vector Vibrating Sample Magnetometer (model 10 MicroSense, USA);
Superconducting Quantum Interference Device Magnetometer (Quantum Design);
Differential Scanning Calorimeter (F1 Phoenix, NETZSCH);
Setup for measurements of magneto-electric effect;
Ball milling (Retsch E-Max);
Optical and fluorescence microscopy (EVOS Cell Imaging Systems);
Dynamic Light Scattering (Malvern Zetasizer Nano);
Chemical laboratory, ovens with controlled atmospheres and glovebox;
Powder X-Ray Diffraction (Philips);
Thermogravimetric Analyzer (F3 Tarsus, NETZSCH).

Research interests

1) Synthesis and magnetic properties investigation of nanoparticles;
2) Application of nanoparticles in biomedicine (hyperthermia, magneto-mechanical interactions, magnetic tweezers);
3) Investigation of the magnetic interaction between nanoparticles;
4) Effect of the magnetic field on the live systems;
5) Multiferroic material.

Conferences and Schools (16 contributions)

Mar. 8-12, 2021
JFBFT

4a Jornada Francisco Tourinho – (Brasilia, Brasil)
Poster presentation online: "Effect of ultrathin shell in $CoFe_2O_4/NiFe_2O_4$ and $CoFe_2O_4/NiO$ core/shell nanoparticles on magnetic properties"
Alexander Omelyanchik, Silvia Villa, Gurvinder Singh, Valeria Rodionova, Fabio Canepa, Davide Peddis

Feb. 11-12, 2021
MAgnet

The VII Italian Conference on Magnetism – (Florence, Italy)
Poster presentation online: "Hard/soft and soft/hard magnetic spinel ferrites nanoparticles"
Alexander Omelyanchik, Silvia Villa, Gurvinder Singh, Gaspare Varvaro, Kalliopi Trohidou, Marianna Vasilakaki, Fabio Canepa, Davide Peddis

Jan. 29-31, 2020
NALS

2nd International Conference on Nanomaterials Applied to Life Sciences (Madrid, Spain)
Poster presentation: "Magnetic Properties of Spinel Ferrite Nanoparticles Engineered by the Synthesis Process and Chemical Composition"
A. Omelyanchik, G. Muscas, S. Villa, F. Canepa, G. Singh, V. Rodionova and D. Peddis

Feb. 10-12, 2020

Conference on Superconductivity and Functional Oxides

SuperFox	(Santa Margherita Ligure, Italy) *Poster presentation:* "Hard/soft and soft/hard magnetic spinel ferrites nanoparticle" A. Omelyanchik, S. Villa, G. Singh, F. Canepa, G. Varvaro and D. Peddis
Dec. 8-12, 2019 3NANO	5th International Conference on Nanoscience, Nanotechnology and nanobiotechnology (Brasilia, Brasil) *Poster presentation:* "Magnetic and structural properties of cobalt ferrite nanoparticles doped with zinc and nickel" Alexander Omelyanchik, Gurvinder Singh, Mikhail Volochaev, Alexey Sokolov, Ivan Kozenkov, Valeria Rodionova, and Davide Peddis
Aug. 18-22, 2019 IBCM	International Baltic Conference on Magnetism 2019 (Svetlogorsk, Russia) *Poster presentation:* "Controlling the magnetic properties of sub 10 nm ferrite nanoparticles by engineering the synthesis process" G. Muscas, M. Cobianchi, A. Lascialfari, C. Cannas, A. Musinu, A. Omelyanchik, V. Rodionova, V. Mameli, and D. Peddis.
May 26-31, 2019 ICFPM	10th International Conference on Fine Particle Magnetism 2019 (Gijón, Spain) *Poster presentation*: "Magnetocrystalline And Surface Anisotropy In CoFe2O4 Nanoparticles Dispersed In Silica Matrix" Alexander Omelyanchik, Maria Salvador, Carla Cannas, Dino Fiorani, Anna Musinu, Montserrat Rivas, Valeria Rodionova, Davide Peddis;
Sep. 9-14, 2018 NAP	IEEE International Conference on "Nanomaterials Applications & Properties" (Zatoka, Ukraine) *Poster presentations*: 1) "Nanocomposite of cobalt and bismuth ferrite nanoparticles" Alexander Omelyanchik, Irina Baraban, Davide Peddis and Valeria Rodionova 2) "Magnetic interactions in powder and pressed alpha-iron nanoparticles" Alexander Omelyanchik, Mikhail Gorshenkov, Igor Beketov, Gaspare Varvaro, Valeria Rodionova 3) "Study of magnetic behavior of magnetite nanoparticles dispersed in fluid" Alexander Omelyanchik, Sara Laureti, Gaspare Varvaro, Valeria Rodionova, Vladan Kusigerski, Nikola Knezevic, Davide Peddis and Erzsébet Illés
Sep. 3-7, 2018 JEMS	9th Joint European Magnetic Symposia (Mainz, Gemany) *Poster presentation*: "Surfaces effects and cationic distribution in ultra-small $CoFe_2O_4$ nanoparticles" Alexander Omelyanchik, Maria Salvador, Carla Cannas, Dino Fiorani, Anna Musinu, Montserrat Rivas, Valeria Rodionova, Davide Peddis;
July 2-6, 2018 ISMANAM_2018	The 25th International Symposium on Metastable, Amorphous and Nanostructured Materials (Rome, Italy) "Magnetic properties of core/shell manganese oxide nanoparticles before and after degradation in water" Alexander Omelyanchik, Gurvinder Singh, Birgitte Hjelmeland McDonagh, Valeria Rodionova, Dino Fiorani, Davide Peddis, Sara Laureti;
Dec. 13-15, 2017 NALS	Nanomaterials Applied to Life Sciences - 2017 (Gijón, Spain) *Poster presentation*: "Evolution of magnetic properties of manganese oxide nanoparticles during dissolution" Alexander Omelyanchik, Gurvinder Singh, Birgitte Hjelmeland McDonagh, Valeria Rodionova, Dino Fiorani, Davide Peddis, Sara Laureti;
Oct. 23-27, 2017	Magnetic nanomaterials for biomedicine: synthesis, properties, application (Zvenigorod, Russia) *1) Oral talk in Russian*: "Эволюция магнитных свойств при переходе от

наночастиц Mn_3O_4/MnO со структурой ядро/оболочка к полым наночастицам Mn_3O_4 // From Mn_3O_4/MnO core-shell nanoparticles to hollow Mn_3O_4: evolution of magnetic properties"
A.Омельянчик, Г.Синг, Б.Мак-Донах, В.Родионова, Д.Фиорани, Д.Педдис, С.Лаурети;
2) Poster presentation: "Development of electro-magnetic manipulator based on planar microwires for control of ferromagnetic nanoparticles"
Alexander Omelyanchik, Valeria Rodionova, Valentine Novosad

Sep. 6-9, 2017	Phase Transitions, Critical and Nonlinear Phenomena in Condensed Matter physics Conference (Makhachkala, Russia) *Poster presentation (in Russian):* "Эволюция магнитных свойств при переходе от наночастиц Mn_3O_4/MnO со структурой ядро/оболочка к полым наночастицам Mn_3O_4 // From Mn_3O_4/MnO core-shell nanoparticles to hollow Mn_3O_4: evolution of magnetic properties" A.Омельянчик, Г.Синг, Б.Мак-Донах, В.Родионова, Д.Фиорани, Д.Педдис, С.Лаурети;
Aug. 20-24, 2017 IBCM	International Baltic Conference on Magnetism 2017 (Svetlogorsk, Russia) *Poster presentations:* 1) "From Mn_3O_4/MnO core-shell nanoparticles to hollow Mn_3O_4: evolution of magnetic properties" Alexander Omelyanchik, Gurvinder Singh, Birgitte Hjelmeland McDonagh, Valeria Rodionova, Dino Fiorani, Davide Peddis, Sara Laureti; 2) "Magnetic properties of $CoFe_2O_4/SiO_2$ nanoparticles: magnetocrystalline and surface component of anisotropy" Alexander Omelyanchik, Maria Salvador, Carla Cannas, Dino Fiorani, Anna Musinu, Montserrat Rivas, Valeria Rodionova, Davide Peddis;
July 1-5, 2017 MISM	Moscow International Symposium on Magnetism 2017 (Moscow, Russia) *Poster presentation:* "Study of magnetic behavior of magnetite nanoparticles dispersed in fluid" Alexander Omelyanchik, Sara Laureti, Gaspare Varvaro, Valeria Rodionova, Vladan Kusigerski, Nikola Knezevic, Davide Peddis and Erzsébet Illés;
Nov. 8-11, 2016	XIV Kurchatov Youth Scientific School (Moscow, Russia) Oral talk (*in Russian*): "Investigation of magnetic properties of iron oxide nanoparticles" A. Omelyanchik, V. Bagratashvily, A. Emelyanov, A. Inushkin, V. Rodionova, A. Tandenkov, L. Sajti, B.N.Chichkov;
Oct. 12-16, 2016	The International Joint School "Smart Nanomaterials and X-ray Optics 2016: Modeling, Synthesis and Diagnostics" (Kaliningrad, Russia) *Poster presentation:* "Measuring magnetic properties of ferrofluids using Henkel plots protocol" Alexander Omelyanchik, Erzsébet Illés, Sara Laureti, Gaspare Varvaro, Valeria Rodionova, Ana Mrakovic, Vladan Kusigerski, Vojislav Spasojevic, Sanja Vranjes-Djuric, Nikola Knezevic and Davide Peddis;
Apr. 18-22, 2016	Italian School on Magnetism (Milan, Italy) *Poster presentation:* "Experimental protocols for measuring magnetic properties of ferrofluids" Alexander Omelyanchik, Erzsébet Illés, Sara Laureti, Gaspare Varvaro, Valeria Rodionova, Ana Mrakovic, Vladan Kusigerski, Vojislav Spasojevic, Sanja Vranjes-Djuric, Nikola Knezevic and Davide Peddis;
Oct. 26-28, 2015	XI National Conference on Nanophase Materials (Rome, Italy):

Aug. 30 – Sep. 3, 2015 International Baltic Conference on Magnetism: Focus on Biomedical Aspects (Svetlogorsk, Russia).

Publications

1) Optimization of a NdFeB permanent magnet configuration for in-vivo drug delivery experiments;
A.Omelyanchika, G.Lamura, D.Peddis, F.Canepa;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2020.167491

2) Control of oxidative stress in Jurkat cells as a model of leukemia treatment;
S.Pshenichnikov, A.Omelyanchik, M.Efremova, M.Lunova, N.Gazatova, V.Malashchenko, O.Khaziakhmatova, L.Litvinova, N.Perov, L.Panina, D.Peddis, O.Lunov, V.Rodionova, K.Levada;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2020.167623

3) Magnetocrystalline and surface anisotropy in CoFe2O4 nanoparticles;
Alexander Omelyanchik, María Salvador, Franco D'Orazio, Valetina Mameli, Carla Cannas, Dino Fiorani, Anna Musinu, Montserrat Rivas, Valeria Rodionova, Gaspare Varvaro, Davide Peddis;
Nanomaterials;
DOI: 10.3390/nano10071288

4) Multifunctional Fe3O4-Au Nanoparticles for the MRI Diagnosis and Potential Treatment of Liver Cancer
Elena Kozenkova, Kateryna Levada, Maria V Efremova, Alexander Omelyanchik, Yulia A Nalench, Anastasiia S Garanina, Stanislav Pshenichnikov, Dmitry G Zhukov, Oleg Lunov, Mariia Lunova, Ivan Kozenkov, Claudia Innocenti, Martin Albino, Maxim A Abakumov, Claudio Sangregorio, Valeria Rodionova;
Nanomaterials;
DOI: 10.3390/nano10091646

5) Ferromagnetic glass-coated microwires for cell manipulation;
A. Omelyanchik, A. Gurevich, S. Pshenichnikov, V. Kolesnikova, B. Smolkova, M. Uzhytchak, I. Baraban, O. Lunov, K. Levada, L. Panina, V. Rodionova
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2020.166991

6) Progressive lysosomal membrane permeabilization induced by iron oxide nanoparticles drives hepatic cell autophagy and apoptosis;
K. Levada, S. Pshenichnikov, A. Omelyanchik, V. Rodionova, A. Nikitin, A. Savchenko, I. Schetinin, D. Zhukov, M. Abakumov, A. Majouga, M. Lunova, M. Jirsa, B. Smolková, M. Uzhytchak, A. Dejneka, O. Lunov;
Nano Convergence;
DOI: 10.1186/s40580-020-00228-5

7) Ultrasensitive magnetic field sensors for biomedical applications;
Dmitry Murzin, Ekaterina Levada, Victor Belyaev, Alexander Omelyanchik, Larissa Panina, Valeria Rodionova;
Sensors;
DOI: 10.3390/s20061569

8) Hard magnetic properties of Co-rich microwires crystallized by current annealing
Svetlana A. Evstigneeva, Makhsudsho G. Nagmatov, Alexander Omelyanchik, Nikolai A. Yudanov, Valeria V. Rodionova, Larissa V. Panina
IEEE Magnetics Letters;
DOI: 10.1109/LMAG.2020.2974152

9) Magnetic-Assisted Treatment of Liver Fibrosis;
Kateryna Levada, Alexander Omelyanchik, Valeria Rodionova, Ralf Weiskirchen, Matthias Bartneck;
Cells;
DOI: 10.3390/CELLS8101279

10) Magnetic Interactions Versus Magnetic Anisotropy in Spinel Ferrite Nanoparticles;
Giuseppe Muscas, Marco Cobianchi, Alessandro Lascialfari, Carla Cannas, Anna Musinu, Alexander Omelyanchik, Valeria Rodionova, Dino Fiorani, Valentina Mameli and Davide Peddis;
IEEE Magnetics Letters;
DOI: 10.1109/LMAG.2019.2956908

11) High-quality α-Fe nanoparticles synthesized by the electric explosion of wires;
A. Omelyanchik, G. Varvaro, M. Gorshenkov, I. Beketov, V. Rodionova;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2019.04.001

12) Magnetorheological foams for multiferroic applications;
Makarova L.A., Alekhina Yu.A., Omelyanchik A.S., Rodionova V.V., Nosan M.M., Peddis D., Spiridonov V.V., Perov N.S.;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2019.04.001

13) Experimental protocols for measuring properties of nanoparticles dispersed in fluids; Alexander Omelyanchik, Valeria Rodionova, Davide Peddis, Gaspare Varvaro, Sara Laureti, María Salvador, Ana Mrakovic, Vladan Kusigerski, Erzsébet Illés, Nikola Knezevic;
NAP Proceedings for IEEE Xplore;
DOI: 10.1109/NAP.2018.8915059

14) Magnetic and optical properties of gold-coated iron oxide nanoparticles;
Alexander Omelyanchik, Maria Efremova, Natalia Myslitskaya, Andrey Zubin, Benjamin J. Carey, Julian Sickel, Helmut Kohl, Rudolf Bratschitsch, Maxim Abakumov, Alexander Majouga, Ilya Samusev, Valeria Rodionova;
Journal of Nanoscience and Nanotechnology;
DOI: 10.1166/jnn.2019.16797

15) Inhomogeneous magnetic field influence on magnetic properties of NiFe/IrMn thin film structures;
K.Gritsenko, A.Omelyanchik, A.Berg, I.Dzhun, N.Chechenin, O.Dikaya, O.A.Tretiakov, V.Rodionova;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2018.10.013

16) Tunable magnetic properties of Ni-doped CoFe2O4 nanoparticles prepared by the sol-gel citrate self-combustion method;
A. Omelyanchik, G. Singh, A. Sokolov, V. Rodionova, D. Peddis;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2018.12.064

17) Design of conductive microwire systems for manipulation of biological cells;
Omelyanchik, A; Levada, E; Ding, J; Lendinez, S; Pearson, J; Efremova, M; Bessalova, V; Karpenkov, D; Semenova, E; Khlusov, I; Litvinova, L; Abakumov, M; Majouga, A; Perov, N; Novosad, V; Rodionova, V;
Transactions on Magnetics - Conferences 2018;

DOI: 10.1109/TMAG.2018.2819823

18) Elastic coupled ferromagnetic and ferroelectric micro-particles: new multiferroic materials based on polymer, NdFeB and PZT particles;
Lyudmila Makarova, Yuliya Alekhina, Alexander Omelyanchik, Valeria, Rodionova, Olga Malyshkina, Nikolai Perov;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2017.11.121

19) Granulocyte-macrophage progenitor cells response to magnetite nanoparticles in a static magnetic field;
I. A. Khlusov, A.S. Omelyanchik, V.V. Rodionova, O.E. Saveleva, T.A. Fedushchak, L.S. Litvinova, M.Yu. Khlusova, G.B. Slepchenko;
Journal of Magnetism and Magnetic Materials;
DOI: 10.1016/j.jmmm.2017.12.017

20) From Mn3O4/MnO Core-Shell Nanoparticles to Hollow Mn3O4: Evolution of Magnetic Properties;
Omelyanchik, Alexander; Singh, Gurvinder; McDonagh, Birgitte; Rodionova, Valeria; Fiorani, Dino; Peddis, Davide; Laureti, Sara;
Nanotechnology;
DOI: 10.1088/1361-6528/aa9e59

21) The New Multiferroic Composite Materials Consisting of Ferromagnetic, Ferroelectric and Polymer Components;
Makarova, L. A., Rodionova, V. V., Alekhina, Y. A., Rusakova, T. S., Omelyanchik, A. S., & Perov, N. S.;
IEEE Transactions on Magnetics;
DOI: 10.1109/TMAG.2017.2699740

06.04.2021