



CURRICULUM VITAE

Yury P. Rakovich



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EDUCATION

1991 – 1995 Institute of Physics, Belarus Academy of Sciences, Minsk (PhD, 1995)
1980 – 1984 Belarussian State University, Minsk (Diploma, 1984)

PROFESSIONAL EXPERIENCE

Since 2010 **Research Professor**, IKERBASQUE, Materials Physics Center and Polímeros y Materiales Avanzados: Física, Química y Tecnología, University of the Basque Country, Spain
2001-2010 **Senior Research Fellow** at School of Physics and Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN), Trinity College, Dublin, Ireland
1998-2001 **Principal Researcher** at the Department of Physics, University of Minho, Braga
1996-1998 **Associate Professor** (Docent) in Physics, Brest State Technical University
1995-1996 **Lecturer in Physics**, Brest State Technical University

OTHER AFFILIATIONS

2017-2020 **Director of Laboratory and Group Leader (Principal Investigator)** of Hybrid Photonic Nanomaterials, National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Moscow, Russia
Since 2010 **Research Associate**, Donostia International Physics Center, in San Sebastián, Spain

RESEARCH AREAS

Nanostructures:

- Colloidal Quantum Dots (nanocrystals) and self-assembled nanostructures
- Coupled quantum dot nanostructures
- Semiconductor nanowires
- Plasmonic nanoparticles and nanostructures
- Organic-inorganic hybrid nanomaterials (semiconductor- and metal- nanoparticles and J-aggregates of organic dyes)
- High-Q microcavities, coupled microcavities, photonic nanojets
- Chiral nanostructures
- Nano-bio hybrid materials

Areas and experises:

- Nanophotonics
- Optical spectroscopy
- Confocal fluorecence lifetime imaging
- Single dots/molecules microscopy and spectroscopy
- Photon- and fluorecence correlation spectroscopies
- Raman spectroscopy, SERS and other plasmon enhanced phenomena
- Excitons in hybrid organic/inorganic nanomaterials, stong coupling effects
- Enhanced light harvesting

RESEARCH GRANTS

Since 2021 “Propiedades estructurales y electrónicas de perovskitas híbridas en condiciones variables de presión, temperatura, interfaces e iluminación”, Project PIBA_2021_1_0026 from the Basque Government
Since 2021 “Light-controlled bright and stable plexcitonic quantum emitters operating in both single-photon and entangled-photon-pair emission modes”, H2020 Marie Skłodowska-Curie Action - EU.1.3.2. project (QESPEM, contract n. 101025664), Supervisor

- Since 2020 “Quantitative analysis of the contribution of hot carriers and the thermal effect in plasmonic assisted photocatalysis“, Project PID2019-111772RB-I00 from *the Spanish Ministry of Science and Innovation*
- 2019-2021 “Quantum nanophotonics for the characterization of new processes and applications in molecular spectroscopy, near-field microscopy and quantum technologies with photons“
Project IT1164-19 from *Department of Education of the Basque Government*
- 2019 “Chemical synthesis of nanostructured materials for health and energy“
Grant No.: SAREA2019-RED2019, 2019-CIEN-000050-01, from *Gipuzkoako Foru Aldundia/Diputación Foral de Gipuzkoa*
- 2019-2020 “High performance multi-parameter systems for the detection and characterization of semiconductor colloidal nanocrystals with improved properties” Grant No.: 05.617.21.0057, from *the Ministry of Science and Higher Education of the Russian Federation*
- 2017-2020 “Linear and nonlinear photonics at nano–bio interfaces” Grant No.: 14.Y26.31.0011 from *the Ministry of Education and Science of the Russian Federation*
- 2017-2021 “Quantum nanoplasmonics for active control of optoelectronics, field-enhanced spectroscopy and nanoscopy“ (PLASMOQUANTUM), Project Fis2016.80174-P from *the Spanish Ministry of Economy and Competitiveness (MINECO)*
- 2014-2016 “Optoelectronics of (sub)nanometric plasmonic gaps for field-enhanced spectroscopy and microscopy” (PLASMOGAP), Project FIS2013-41184-P of *the Spanish Ministry of Economy and Competitiveness (MINECO)*
- 2014-2014 “Study of coupling between molecular excitations in J-aggregates and surface plasmons in metal nanoparticles” *European Science Foundation*
- 2014-2014 “Study of the effect of coupling between electronic excitations in J-aggregates and plasmons in metal nanoparticles on the photoluminescence properties of hybrid nanosystems” *European Science Foundation*
- 2012-2013 “Enhancement effects in plasmonic nanocavities formed at metal nanowire junctions” *European Science Foundation*
- 2012-2013 “Development of units of nano-bio-memory systems based on hybrid structures of bacteriorhodopsin and semiconductor quantum dots”
Russian Federal Target Program “Conducting research under the guidance of visiting researchers from abroad”
- 2011-2011 “Nonlinear optical properties of hybrid system of plasmonic nanoparticles and J-aggregates” *European Science Foundation*
- 2011-2013 “Quantum Dots Spectroscopy” ITORTEK 2011 Nanoinker / Subproject NANOPHOT (WP3)/ *Department of Industry of the Basque Government*
- 2010-2013 “Development of semiconductor nanostructures based on quantum dots and metal nanoparticles for nanoscale optoelectronics and energy conversion devices”
Ikerbasque Start-up grant
- 2008-2010 “Physics of photonic microresonators” *Science Foundation Ireland*
- 2006-2010 “Physics of the functioning and nanoelectronic fabrication technology of integrated opto-spintronic elements, and information processing systems” Subproject of Program of the *Ministry of Education of the Republic of Belarus* “Nanoelectronics”
- 2006-2010 “Spectral characterization of multilayer nanocrystalline structures and optical properties of individual nanocrystals embedded in dielectric matrix” Subproject of *State Program of Fundamental and Applied Research*
- 2006-2008 “Synthesis and growth dynamics of fluorescent CdTe nanowires” *Centre for Research on Adaptive Nanostructures*
- 2006-2008 “Engineering plasmon waveguides” *Science Foundation Ireland*
- 2005-2006 “Quantum dot-cellular interactions for nanoscale drug delivery“ *Science Foundation Ireland*
- 2004-2006 Low-loss microfibers on Si substrate for photonics applications” *Enterprise Ireland*
- 2002-2005 “Quantum-dot microlasers with a spherical dielectric microcavity for fibre-optic communications” *Science Foundation Ireland*
- 2001-2005 “Electronics 17 (Subproject): Investigation of propagation, conversion and emission of electromagnetic waves in semiconductor nanostructures and mesoscopic systems

- with modified density of photonic states” *State Program of Fundamental Research of Republic of Belarus*
- 2001-2005 “Optical nonlinear properties of nanocrystals in external electric field” Subproject of *the Republic of Belarus Inter-University Programme “Nanoelectronics”*
- 2001-2002 “Deposition and doping of gallium nitride films” *Enterprise Ireland*
- 1999-2001 “Optical Nonlinearity in Ge and Cd(S,Se) Nanocrystals” *Fundação Para a Ciência e a Tecnologia*, Portugal
- 1998-1999 “Optical Properties of Cd(S,Se,Te) Nanocrystals” *NATO Science Fellowship*
- 1997-1998 “Photoluminescence and lasing properties of ZnSe and GaN heteroepitaxial layers with quantum wells” *Polska Akademia Umiejetnosci, Fundacja Sniadeckich*. Poland

SUPERVISION OF POSTGRADUATE STUDENTS

- *Matthias Gerlach*, PhD “Optical characterisation and manipulation of active microspheres” School of Physics, Trinity College Dublin, 2007
- *Ciarán Smyth*, PhD “Surface-enhanced Raman Spectroscopy and Fluorescence Spectroscopy towards Detection of Pterins” School of Physics, Trinity College Dublin. 2007
- *David O’Dwyer*, PhD “Optical trapping based on conical refraction of light”, School of Physics, Trinity College Dublin. 2008
- *David McCloskey*, PhD “Optics of microcavities and nanojets”, School of Physics, Trinity College Dublin. 2009
- *Herman Borovkov*, Master “Optical Microscopy of Single Semiconductor Quantum Dots” Materials Physics Center in San Sebastian, 2016
- *Nekane Lozano Hernández*, “Hybrid materials from J-aggregates and differently-shaped gold nanoparticles: the difference between weak and strong coupling” Materials Physics Center in San Sebastian, 2017
- *Dupont Emelie*, “Strongly Coupled Plasmon-Exciton Hybrid Nanostructures” Materials Physics Center in San Sebastian, 2020

TEACHING

- 2011-2021 Lecture course: Optics of Semiconductor Quantum Dots and Nanostructures (Masters in Nanoscience, Nanostructural Properties) DIPC, EHU/UPV
- 2007-2008 Lecture course: Current Electricity (Senior Freshman, Phy2009) School of Physics, Trinity College Dublin
- 2005-2007 Lecture course: Application of Physics in Life Science (Junior Freshman, Phy1108) School of Physics, Trinity College Dublin
- 2006-2008 Lecture units: MSc. Molecular Medicine in Nanotechnology School of Medicine, Trinity College Dublin
- 2006-2008 Lecture units: Introductory Series for Physics Postgraduate in Biological Physics School of Physics, Trinity College Dublin
- 2004-2006 Senior Freshman Course Tutor. Mentor of Senior Freshman group study project. School of Physics, Trinity College Dublin
- 2003-2004 Supervising Freshman labs: mechanics and optics School of Physics, Trinity College Dublin
- 1995-1998 Lecture courses: Optics and Radioactivity

SUMMARY OF PUBLICATIONS

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|-----------------------------|-----|---------------------------------|
| ▪ Books: | 3 | Total number of citations: 4218 |
| ▪ Book chapters: | 3 | h-index: 32 |
| ▪ Journal articles: | 120 | ORCID: 0000-0003-0111-2920 |
| ▪ Invited journal articles: | 5 | ResearcherID: C-4446-2008 |
| ▪ Patent applications: | 8 | |
| ▪ Conference proceedings: | 96 | |

CONFERENCE COMMITTEE INVOLVEMENT

- **General Chair** of EMN Meeting on Nanoparticles, 2017, Donostia - San Sebastian, Spain
- **General Chair** of Organic Electronics and Photonics Meeting, 2016, Donostia - San Sebastian, Spain
- **General Chair** of Collaborative Conference on Crystal Growth (3CG), 2016, Donostia-San Sebastian, Spain
- **Co-Chair** of Energy Materials Nanotechnology (EMN) Meeting on Droplets, 2016, May 9-13, Donostia-San Sebastian, Spain
- Workshop MANA-DIPC “Nanostructures and Complex Functional Materials”, 2015, Donostia - San Sebastian, Spain
- NanoSpain 2014 Conference, 2014, Madrid, Spain
- 14th International Conference on Transparent Optical Networks – ICTON 2012, 2012, Coventry, England
- Villa Conference on Interactions Among Nanostructures, 2011, Las Vegas, USA
- 14th International Conference on Solid Films and Surfaces (ICSFS), 2008, Trinity College, Dublin, Ireland
- 28th Annual Meeting of Microscopical Society of Ireland, 2004, Trinity College Dublin, Ireland

SELECTED INVITED PRESENTATIONS

- 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics, (META 2021), 2021, 20-23 July, Warsaw, Poland
- IV International Conference on Metamaterials and Nanophotonics (METANANO), July 15-19, 2019, St. Petersburg, Russia
- IV International Conference on Applications in Optics and Photonics (AOP2019), May 31 – June 04, 2019, Lisbon, Portugal
- PCNSPA 2018 - Photonic Colloidal Nanostructures: Synthesis, Properties, and Applications, June 4-8, 2018, Saint Petersburg, Russia
- The 2nd International Symposium "Physics, Engineering and Technologies for Biomedicine", 2017, Moscow, Russia
- 19th International Conference on Transparent Optical Networks – ICTON 2017, 2017, Girona, Spain
- III International Conference on Applications in Optics and Photonics (AOP 2017), 2017, Faro, Portugal (**Keynote speaker**)
- META'16, the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics, Special Symposium „Hybrid Plasmonics and Functional Nanomaterials“, 2016, Torremolinos (Malaga), Spain
- PCNSPA Conference 2016 - Photonic Colloidal Nanostructures: Synthesis, Properties, and Applications, 2016, Saint-Petersburg, Russia
- Frontier Forum on Quantum Information, 2016, Chengdu, China
- XIV International Conference on Quantum Optics and Quantum Information, 2015, Minsk, Belarus
- 17th International Conference on Transparent Optical Networks, 2015, Budapest, Hungary
- ImagineNano 2015, March 10-13, Bilbao, Spain (**Keynote speaker**)
- NanoSpain 2014, March 11-14, Madrid, Spain
- 16th International Conference on Transparent Optical Networks, 2014, Graz, Austria
- 15th International Conference on Transparent Optical Networks, 2013, Cartagena, Spain
- International Workshop "Photonic of Functional Nanomaterials" 2013, Hong Kong
- The 13th RIES-Hokudai International Symposium, 2012, Chateraise Gateaux Kingdom Sapporo, Japan
- International Workshop on Ordered and Nonordered Superstructures of Nanosized Objects: Preparation, Properties and Applications, 2012, Dresden, Germany
- EMN: Villa Conference on Interaction Among Nanostructures, 2012, Doubletree by Hilton Orlando, USA

- 14th International Conference on Transparent Optical Networks, 2012, July 4, 2012, Coventry, England
- 13th International Conference on Transparent Optical Networks, 2011, Stockholm, Sweden
- International Conference "Nanomeeting-2011", 2011, Minsk, Belarus
- EMN: Conference on Interactions Among Nanostructures, 2011, Las Vegas, USA
- 10th Anniversary International Conference on Transparent Optical Networks, 2008, Athens, Greece
- Symposium on Photonic Technologies for Framework Programme 7. OPERA 2015, 2006, Wroclaw University of Technology, Poland.
- Advanced Research Workshop on Nanoparticle-Based Nanostructures, 2000, Vigo, Spain

STAYS AND SELECTED INVITED TALKS AT INTERNATIONAL CENTERS

- *Nottingham Trent-University*, Nottingham, UK 1994: "Effect of electric field on the excitonic luminescence of bulk- and quantum-size CdS crystals"
- *Wroclaw Technological University*, Wroclaw, Poland 1997: "Photoluminescence lineshape of excitons in bulk CdS crystals"
- *University of Minho*, Braga, Portugal 1998: "Self-reversal of exciton photoluminescence line in CdS single crystals"
- Institute of Physical Chemistry *University of Hamburg*, Germany 2000: "Optical spectroscopy of thin films of CdS and CdSe nanocrystals"
- Photonics and Optoelectronics Group, *Ludwig-Maximilian-University München*, Germany 2003: "Whispering gallery modes emission from a core-shell system of CdTe nanocrystals on a spherical microcavity"
- Institute of Physical Chemistry *University of Hamburg*, Germany 2004: "Multiphonon assisted excitation of luminescence in II-VI nanocrystals"
- Nanooptics AG, *Humboldt-Universität zu Berlin* 2004: "Multiphonon assisted excitation of luminescence in II-VI nanocrystals"
- The CIC nanoGUNE Consolider, Donostia-San Sebastian, Spain 2009: "Luminescent nanocrystal quantum dots: building blocks for nano-and microdevices"
- Laboratory for Research in Nanoscience, the *University of Reims Champagne-Ardenne*, France 2009: "Photoluminescence studies in CdTe-bacteriorhodopsin composites"
- Research Institute for Electronic Science, *Hokkaido University* 2009: "Photon energy up-conversion in semiconductor quantum dots: implications for anti-Stokes cooling"
- *Center of Physics*, Braga, Portugal 2011: "Spherical microcavities and photonic molecules"
- *University of Minho*, Braga, Portugal 1998: "Quantum Dots for Bio-Energetics"
- Photonics and Optoelectronics Group, *Ludwig-Maximilian-University München*, Germany 2014: "Quantum Dots for Bio-Energetics and Enhanced Light Harvesting: Exploration of Energy Transfer from Semiconductor Nanocrystals to Photosynthetic Biological Complexes"
- Optoelectronics Group, *Trinity College Dublin*, Ireland 2015: "Strong Coupling Effect in Hybrid System of Plasmonic Nanoparticles and J-aggregates"
- LOMA - Laboratoire Ondes et Matière d'Aquitaine, *Université de Bordeaux* 2016: "Quantum Dots for Bio-Energetics and Enhanced Light Harvesting: Exploration of Energy Transfer from Semiconductor Nanocrystals to Photosynthetic Biological Complexes"

HONORS AND AWARDS

- Tomson Reuters Highly Cited Researcher Award (2016)
- Optical Society of America Senior Membership Designation Award (2016)
- ACS Publications Award (2016)
- Elsevier Reviewer Recognition Award (2015)
- 3rd prize for the best FLIM image (PicoQuant Application Gallery Contest), Germany (2011)
- The Innovation Award in recognition for achievements in inventions and for newly created intellectual property. Centre for Research on Adaptive Nanostructures, Ireland (2010)
- NATO Science Fellowship Award (1999)
- Fellowship from Polish Academy of Learning, (Sniadeccy Foundation), Poland (1997)

- George Soros Foundation Award (1996)

EXTERNAL ROLES AND RESPONSIBILITIES

- **Member of Editorial Board** of Nanoscale Research Letters (Springer)
- **Reviewer of research grant applications:** Czech Science Foundation; Swiss National Science Foundation; Saint Petersburg State University; Agencia Nacional de Promoción Científica y Tecnológica (ANPCYT) de Argentina; German-Israeli Foundation for Scientific Research and Development
- **Research projects consulting:** “Functional Structuring, Inter-particle Interaction and Energy Transfer in Ensembles of Nanocrystal Quantum Dots” (PTDC/FIS/113199/2009), University of Minho, Braga, Portugal
- **External examiner for PhD defenses:** Trinity College Dublin (Ireland), 2012; University of Ireland, Galway, 2012; Trinity College Dublin (Ireland), 2018; University of Minho (Portugal), 2020
- **Member of evaluation committee** for awarding Master’s in Nanoscience Degree (The Materials Physics Department of the University of the Basque Country and the Center of Materials Physics (CSIC-UPV/EHU), in collaboration with CIC nanoGUNE and Donostia International Physics Center in San Sebastian).
- **Regular referee** for Nature, Science, AIP, ACS, RSC, OSA, IOP, Elsevier, Wiley Publishing Groups journals.
- **Coordinator of informal scientific seminar** at Materials Physics Center

MEMBERSHIPS IN SCIENTIFIC ASSOCIATIONS

- The Optical Society of America (OSA)
- The American Chemical Society (ACS)