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Education:

- Ph.D. Physics Montana State University (2010) GPA: 3.93/4
- MS Mathematics Saint-Petersburg State University of Information Technologies, Mechanics and Optics (SPbSU ITMO) (2003) GPA: 5/5

Research and Work Experience:

- Postdoctoral Associate, Los Alamos National Lab, 2014 – *
- Director's Postdoctoral Fellow, Los Alamos National Lab, 2012 – 2014
- Postdoctoral Fellow, School of Chemistry and Biochemistry, Georgia Institute of Technology, 2010 – 2012
- Graduate Research Assistant, Physics Department, Montana State University, 2004 – 2010

Selected publications (45 papers; 1203 citations; h-index: 16; Google Scholar:

<http://scholar.google.com/citations?user=j1EVarwAAAAJ>

- Cirloganu C.M., Padilha L.A., Lin Q., Makarov N.S., Velizhanin K.A., Luo H., Robel I., Pietryga J.M., Klimov V.I., *Nature Comm.*, **5**, (2014), 4148.
- Makarov N.S., McDaniel H., Fuke N., Robel I., Klimov V.I., *J. Phys. Chem. Lett.*, **5**, (2014), 111-118.
- McDaniel H., Fuke N., Makarov N.S., Pietryga J.M., Klimov V.I., *Nature Comm.*, **4**, (2013), 3887.
- Starkey J.R., Makarov N.S., Drobizhev M., Rebane A., *Biomed. Opt. Expr.*, **3**, (2012), 1534-1547.
- Drobizhev M.A., Makarov N.S., Tillo S.E., Hughes T., Rebane A., *Nature Methods*, **8**, (2011), 393-399.
- Makarov N.S., Drobizhev M., Rebane A., *Opt. Expr.*, **16**, (2008), 4029-4047.
- Rogers J.E., Slagle J.E., Krein D.M., Burke A.R., Hall B.C., Fratini A., McLean D.G., Fleitz P.A., Cooper T.M., Drobizhev M., Makarov N.S., Rebane A., Kim K.-Y., Farley R., Schanze K.S., *Inorg. Chem.*, **46**, (2007), 6483-6494.

Research interests:

- Ultrafast and nonlinear quantitative optical spectroscopy of organic and inorganic nano- and meso-scale materials for diverse applications including biological 3D imaging and microscopy, nanofabrication, solar energy conversion, photodynamic therapy and diagnostics, optical power limiting, all-optical telecommunication, and volumetric optical memory
- Simple and physically-transparent simulations and modeling of nonlinear optical effects and photophysical properties of various materials
- Design and implementation of interactive highly automated robust experimental setups for optical spectroscopy

Selected awards (out of 24, see complete list below):

- OSA Nonlinear Optics Best Conference Talk Award 2013
- Directors Postdoctoral Fellowship, Los Alamos National Lab 2012
- D.J. Lovell SPIE Scholarship (top SPIE student scholarship) 2008
- BACUS Photomask Scholarship 2007
- Medal of Russian Academy of Sciences for the best student work in general physics and

Skills:

- Nonlinear optical methods (two-photon absorption with registration of fluorescence, femtosecond pump-probe, Z-scan)
- Optical design of (microscopic) imaging system
- Optical and hardware/software design of the automated two-photon absorption and transient absorption measurement systems
- Fluorescence lifetime measurements with ps-ns resolution using streak-camera, time-correlated single photon counting systems, single superconducting nanowire single photon detector in the visible and near-infrared spectral regions
- Linear spectroscopy methods (UV-VIS-NIR absorption, emission, quantum yields, anisotropy)
- Operating, maintaining and aligning femtosecond laser systems (Ti:Sa oscillator, amplifier, optical parametric amplifier)
- Comprehensive problem analyzing and solving
- Programming, numerical modeling, computer control of experiments (C, C++, Pascal, Mathematica, LabView)

Ph.D. Thesis: “Ultrafast two-photon absorption in organic molecules: quantitative spectroscopy and applications”, Advised by Prof. Aleksander K. Rebane

The thesis is devoted to fundamental understanding and experimental measurements of two-photon absorption (2PA) in organic molecules as well as to the applications of 2PA in 3D optical memory, optical power limiting, photodynamic therapy and fluorescent microscopy.

- Measured carefully 2PA spectra (in absolute numbers) of a number of commercially available fluorescing dyes in order to establish a reliable set of 2PA standards for further use in our and other laboratories.
- Showed agreement between the quantum-mechanical expression for 2PA cross section and the experimental measurements within the experimental errors, for a broad class of dipolar molecules.
- Used nonlinear spectroscopy to establish validity of a few-level model for the *gerade-gerade* transitions in tetrapyrroles. Showed quasi-symmetric distribution of π -electron conjugation pathway for the tribenzotetraazachlorines.
- Described limitations of the development and implementation of 3D optical memory with the help of computer simulations. Found the allowed range of photophysical and photochemical parameters, and showed experimentally that the 2PA properties of few organic molecules fall within this range.
- Designed a novel method (two-photon analogue of standard multispectral imaging) for non-targeted cancer imaging and diagnostics, based on the difference in the ratios of two-photon excited fluorescence signals, obtained with two different excitation wavelengths.

Other Technical Background:

Software: Mathematica, Visual Studio, LabView, Origin, Microsoft Office, Adobe Photoshop

Hobby:

Landscape and wildlife photography

Detailed Research and Work Experience:***Director's Postdoctoral Fellow, Los Alamos National Lab, 2012 - ****

- Characterized excited state dynamics of core/shell colloidal semiconductor quantum dots, 2012-*.
 - Studied properties of the bulk-like visible emission of the PbSe/CdSe quantum dots
- Investigated upconversion efficiencies of core/shell colloidal semiconductor quantum dots and metal nanoparticle-quantum dot heterostructures, 2012-*.
 - Demonstrated enhancement of the two-photon absorption in the PbSe/CdSe core/shell quantum dots
 - Experimentally showed feasibility of the Auger-assisted upconversion in the PbSe/CdSe core/shell quantum dots
- Developed methods for characterization of the electron transfer rates in mesoporous TiO₂ films sensitized with colloidal quantum dots, 2012-*.
 - Demonstrated importance of the whole device measurements and electrolytes for proper assignment of the transfer rates
 - Assessed volume- and composition-dependent excited charge carrier processes in CuInSe_xS_{2-x} quantum dots
Makarov N.S., McDaniel H., Fuke N., Robel I., Klimov V.I., "Photocharging artifacts in measurements of electron transfer in quantum-dot-sensitized mesoporous titania films", *J. Phys. Chem. Lett.*, **5**, (2014), 111-118.
- Studied carrier multiplication in various colloidal quantum dots, 2012-*.
 - Obtained carrier multiplication quantum yields and thresholds for variously-sized CuInSe_xS_{2-x} quantum dots
 - Measured carrier multiplication quantum yields in Si quantum dots
- Investigated charge dynamics in conjugated quantum dot complexes, 2013-2014.
 - Analyzed role of environment and size effects on the electron and hole transfer in dopamine-conjugated CdSe quantum dots

Postdoctoral Fellow, School of Chemistry and Biochemistry, Georgia Institute of Technology, 2010 - 2012

- Developed automated two-photon absorption measurement system, 2010-2011.
 - Designed hardware and software for high accuracy low noise reliable double channel relative fluorescence-based measurements of two-photon absorption
Makarov N.S., Campo J., Hales J.M., Perry J.W., "Rapid, broadband two-photon-excited fluorescence spectroscopy and its application to red-emitting secondary reference compounds", *Opt. Mater. Expr.*, **1**, (2011), 551-563.
- Characterized the structure-property relations for two-photon absorption of various organic molecules, 2010-2012.
 - Investigated the influence of the coupling, symmetry and planarity on the photophysical properties of triarylamine-diarylboryl single- and multi-arm compounds
 - Assessed the efficiency of the plasmon-absorption enhanced molecules for 2PA-based optical power limiting
Makarov N.S., Mukhopadhyay S., Kada Y., Brédas J.-L., Perry J.W., Pron A., Kivala M., Müllen K., "Impact of electronic coupling, symmetry, and planarization on one- and two-photon properties of triarylamine with one, two, or three diarylboryl acceptors", *J. Phys. Chem. A*, **116**, (2012), 3781-3793.
- Investigated the nonlinear structure-property relations of variously sized semiconductor quantum dots, 2011-2012.
 - Tested the influence of the core and shell size on the photophysical properties of CdSe/ZnSe quantum dots
- Studied photoconversion properties of fluorescent proteins, 2011-2012.

- Verified linear power dependence and independent photoconversion of the neutral and anionic forms of Dendra2 fluorescent protein

Makarov N.S., Cirloganu C., Perry J.W., Lukyanov K.A., Solntsev K.M., "Steady-state and time-resolved spectroscopic studies of green-to-red photoconversion of fluorescent protein Dendra2", *J. Photochem. Photobiol. A*, 280, (2014), 5-13.

Graduate Research Assistant, Physics Department, Montana State University, 2004 - 2010

- Studied of two-photon 3D optical memory, 2004-2006.
 - Simulated the Signal-to-Noise and Signal-to-Background ratios in 3D optical memory devices
 - Demonstrated experimentally efficient materials satisfying the requirements for high speed high density memory

Makarov N.S., Rebane A., Drobizhev M., Wolleb H., Spahn H., "Optimizing two-photon absorption for volumetric optical data storage", *J. Opt. Soc. Am. B*, **24**, (2007), 1874-1885.
- Characterized molecules for efficient optical power limiting, 2004-2010.
 - Confirmed validity of perturbation theory for description of two-photon cross sections

Rebane A., Makarov N.S., Drobizhev M., Spangler B., Tarter E.S., Reeves B.D., Spangler C.W., Meng F., Suo Z., "Quantitative prediction of two-photon absorption cross section based on linear spectroscopic properties", *J. Phys. Chem. C*, **112**, (2008), 7997-8004.

 - Developed a set of reference standards for precise two-photon absorption spectral measurements. This includes accurate characterization of absolute intrinsic 2PA cross sections of 15 commercial dyes in a wide spectral range which can now be widely used for characterization of any new chromophore

Makarov N.S., Drobizhev M., Rebane A., "Two-photon absorption standards in the 550-1600 nm excitation wavelength range", *Opt. Expr.*, **16**, (2008), 4029-4047.
- Characterized new fluorescent proteins (FP) for two-photon microscopy, 2007-2010.
 - Developed new all-optical approach for characterization of linear absorption properties of FPs

Drobizhev M., Tillo S., Makarov N.S., Hughes T.E., Rebane A., "Absolute Two-Photon Absorption Spectra and Two-Photon Brightness of Orange and Red Fluorescent Proteins", *J. Phys. Chem. B*, **113**, (2009), 855-859.

 - Measured two-photon absorption spectra and cross sections of various FP mutants

Drobizhev M.A., Makarov N.S., Tillo S.E., Hughes T., Rebane A., "Two-photon absorption properties of fluorescent proteins", *Nature Methods*, **8**, (2011), 393-399.
- Developed a high precision near-infrared femtosecond pump-probe setup, 2008-2010.
 - Designed and realized computer-controlled experimental setup and controlling software
 - Demonstrated the validity of a few-essential-level model for description of experimentally measured two-photon cross sections

Makarov N.S., Drobizhev M., Wicks G., Makarova E.A., Lukyanets E.A., Rebane A., "Alternative selection rules for one- and two-photon transitions in tribenzotetraazachlorin: quasi-centrosymmetrical π -conjugation pathway of formally non-centrosymmetrical molecule", *J. Chem. Phys.*, **138**, (2013), 214314.
- Developed a near-infrared imaging system for sensitive cancer detection, 2008-2010.
 - Designed an imaging system which uses near-IR two-photon excited fluorescence
 - Demonstrated non-targeted cancer imaging and diagnostics
 - Analyzed biochemical mechanisms of dye sensitivity to cancer cells

Starkey J.R., Makarov N.S., Drobizhev M., Rebane A., "Highly sensitive detection of cancer cells using femtosecond dual-wavelength near-IR two-photon imaging", *Biomed. Opt. Expr.*, **3**, (2012), 1534-1547.

Junior Researcher, Saint-Petersburg State University of Information Technologies, Mechanics and Optics, 1999-2004

- Simulated quasi-phase matched stimulated Raman scattering, 1999-2004.
 - Developed several consequent versions of software for computer simulations of quasi-

phase matching conditions for stimulated Raman scattering in various layered nonlinear media

Makarov N.S., Bespalov V.G., “Effective method of anti-Stokes generation by quasi-phase-matched stimulated Raman scattering”, *J. Opt. Soc. Am. B*, **22**, (2005), 835-843.

Honors and Awards:

- 2013
 - OSA Nonlinear Optics Best Conference Talk Award
 - Los Alamos National Lab “On the Spot” Award
- 2012
 - **Directors Postdoctoral Fellowship, Los Alamos National Lab**
- 2011
 - SPIE Leadership alumni grant
- 2009
 - Photonic Devices + Applications Best Student Paper Award (Runner Up)
 - OSA Incubic/Milton Chang Travel Grant
- 2008
 - **D.J. Lovell SPIE Scholarship (top SPIE student scholarship)**
- 2007
 - **BACUS Photomask Scholarship**
- 2006
 - SPIE Scholarship grant
- 2004
 - Grant of Saint-Petersburg administration for students, graduate students, and young specialists
- 2003
 - Soros student
 - SPIE Scholarship grant
 - Diploma for the best university graduating student
 - Dynasty foundation grant
 - Medal of Ministry of Education of Russian Federation for the best scientific student work in natural, technical, and humanitarian sciences
- 2002
 - Soros student
 - Russian Foundation for Basic Research travel grants
 - Grant of Saint-Petersburg administration for students, graduate students and young specialists
 - **Medal of Russian Academy of Sciences for the best student work in general physics and astronomy**
- 2001
 - Soros student
 - CRDF travel grant
 - Russian Federation’s President grant
 - Diploma of Ministry of Education of Russian Federation for the best scientific student work in natural, technical and humanitarian sciences
- 2000
 - Soros student

Membership in Professional Societies and Leadership Experience:

- SPIE 2001, 2003-2014
- OSA 2001, 2004,
2011-2014
- APS 2010-2014
- IEEE 2003
- Rozhdestvensky Optical Society 2001-2004

- Vice-President of the SPIE Student Chapter of SPbSU ITMO 2004
- President of SPIE Student Chapter of Montana State University 2006-2007
- Vice-President of the SPIE Student Chapter of Montana State University 2007-2008
- IT/Web master of the SPIE Student Chapter of Montana State University 2008-2010

- Member of organizing committee of conferences:
 - “Optics-2002”,
 - “Basic problems of Optics-2002”,
 - “Optics-2003”,
 - "Basic problems of Optics-2004".

References:

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Publications:**- Papers in journals:**

- 1) Devia C.L., Yesudas K., Makarov N.S., Rao V.J., Bhanuprakash K., Perry J.W. "Combined experimental and theoretical study of one- and two-photon absorption properties of D- π -A- π -D type bis(carbazolylfluorenylethynyl) arene derivatives: Influence of aromatic acceptor bridge", *Dyes and Pigments*, vol. 113, 2015, 682-691.
- 2) Cirloganu C.M., Padilha L.A., Lin Q., Makarov N.S., Velizhanin K.A., Luo H., Robel I., Pietryga J.M., Klimov V.I., "Enhanced carrier multiplication in engineered quasi-type-II quantum dots", *Nature Comm.*, vol. 5, 2014, 4148.
- 3) McDaniel H., Koposov A.Y., Draguta S., Makarov N.S., Pietryga J.M., Klimov V.I., "Simple yet versatile synthesis of CuInSe_xS_{2-x} quantum dots for sunlight harvesting", *J. Phys. Chem. C*, vol. 118, 2014, 16987-16994.
- 4) Rebane A., Drobizhev M., Makarov N.S., Wicks G., Wnuk P., Stepanenko Y., Haley J.E., Krein D.M., Fore J.L., Burke A.R., Slagle J.E., McLean D.G., Cooper T.M., "Symmetry breaking in platinum acetylide chromophores studied by femtosecond two-photon absorption spectroscopy", *J. Phys. Chem. A*, vol. 118, 2014, 3749-3759.
- 5) Makarov N.S., Cirloganu C., Perry J.W., Lukyanov K.A., Solntsev K.M., "Steady-state and time-resolved spectroscopic studies of green-to-red photoconversion of fluorescent protein Dendra2", *J. Photochem. Photobiol. A*, vol. 280, 2014, 5-13.
- 6) Sartin M.M., Huang C., Marshall A.S., Makarov N.S., Barlow S., Marder S.R., Perry J.W. "Nonlinear optical pulse suppression via ultrafast photoinduced electron transfer in an aggregated perylene diimide/oligothiophene molecular triad", *J. Phys. Chem. A*, vol. 118, 2014, 110-121.
- 7) Makarov N.S., McDaniel H., Fuke N., Robel I., Klimov V.I., "Photocharging artifacts in measurements of electron transfer in quantum-dot-sensitized mesoporous titania films", *J. Phys. Chem. Lett.*, vol. 5, 2014, 111-118.
- 8) Qu L., Makarov N.S., Zhong C., Perry J.W., Qin J., "Molybdenum(VI) tris(dithiolene) complexes as a new class of three-dimensional two-photon absorption chromophores at telecommunications wavelengths", *J. Mater. Chem. C*, vol. 2, 2014, 614-617.
- 9) McDaniel H., Fuke N., Makarov N.S., Pietryga J.M., Klimov V.I., "An integrated approach to realizing high-performance liquid-junction quantum dot sensitized solar cells", *Nature Comm.* vol. 4, 2013, 3887.
- 10) Arias E., Moggio I., Torres R., Ziolo R.F., Maldonado J.-L., Green K., Cooper T.M., Wicks G., Rebane A., Drobizhev M., Makarov N.S., Ottonelli M., Dellepiane G., "Direct synthesis of 2,5-Bis(dodecanoxy)phenyleneethynylene-butadiynes by Sonogashira coupling reaction", *Eur. J. Org. Chem.*, 2013, 5341-5352.
- 11) Makarov N.S., Drobizhev M., Wicks G., Makarova E.A., Lukyanets E.A., Rebane A., "Alternative selection rules for one- and two-photon transitions in tribenzotetraazachlorin: quasi-centrosymmetrical π -conjugation pathway of formally non-centrosymmetrical molecule", *J. Chem. Phys.*, vol. 138, 2013, 214314.
- 12) Leonova E.S., Makarov N.S., Fonari A., Lucero R., Perry J.W., Sammeth D.M., Timofeeva T.V., "Synthesis, structure, and one- and two-photon absorption properties of N-substituted 3,5-bis(arylidene)propenepiperidin-4-ones", *J. Molec. Struct.*, vol. 1037, 2013, 288-293.
- 13) Bellier Q., Makarov N.S., Bouit P.-A., Rigaut S., Kamada K., Feneyrou P., Berginc G., Maury O., Perry J.W., Andraud C., "Excited state absorption: a key phenomenon for the improvement of biphotonic based optical limiting at telecommunication wavelengths", *Phys. Chem. Chem. Phys.*, vol. 14, 2012, 15299-15307.
- 14) Zou Q., Zhao Y., Makarov N.S., Campo J., Yuan H., Fang D.-C., Perry J.W., Wu F., "Effect

- of alicyclic ring size on the photophysical and photochemical properties of bis(arylidene)cycloalkanone compounds”, *Phys. Chem. Chem. Phys.*, vol. 14, 2012, 11743-11752.
- 15) Campo J., Wenseleers W., Hales J.M., Makarov N.S., Perry J.W., “Practical model for first hyperpolarizability dispersion accounting for both homogeneous and inhomogeneous broadening effects”, *J. Phys. Chem. Lett.*, vol. 3, 2012, 2248-2252.
 - 16) Starkey J.R., Makarov N.S., Drobizhev M., Rebane A., “Highly sensitive detection of cancer cells using femtosecond dual-wavelength near-IR two-photon imaging”, *Biomed. Opt. Expr.*, vol. 3, 2012, 1534-1547.
 - 17) Makarov N.S., Mukhopadhyay S., Kada Y., Brédas J.-L., Perry J.W., Pron A., Kivala M., Müllen K., “Impact of electronic coupling, symmetry, and planarization on one- and two-photon properties of triarylamine with one, two, or three diarylboryl acceptors”, *J. Phys. Chem. A*, vol. 116, 2012, 3781-3793.
 - 18) Drobizhev M., Makarov N.S., Tillo S.E., Hughes T.E., Rebane A., “Describing two-photon absorptivity of fluorescent proteins with a new vibronic coupling mechanism”, *J. Phys. Chem. B*, vol. 116, 2012, 1736-1744.
 - 19) Ji Z., Li Y., Pritchett T.M., Makarov N.S., Haley J.E., Li Z., Drobizhev M., Rebane A., Sun W., “One-photon photophysics and two-photon absorption of 4-[9,9-Di-(2-ethylhexyl)-7-diphenylaminofluoren-2-yl]-2,2':6',2''-terpyridine and their platinum chloride complexes”, *Chem. Eur. J.*, vol. 17, 2011, 2479-2491.
 - 20) Butko M.T., Drobizhev M., Makarov N.S., Rebane A., Brinkman B.C., Gleeson J.G., “Simultaneous multiple-excitation multiphoton microscopy yields increased imaging sensitivity and specificity”, *BMC Biotechnol.*, vol. 11, 2011, 20.
 - 21) Drobizhev M.A., Makarov N.S., Tillo S.E., Hughes T., Rebane A., “Two-photon absorption properties of fluorescent proteins”, *Nature Methods*, vol. 8, 2011, 393-399.
 - 22) Rebane A., Drobizhev M., Makarov N.S., Beuerman E., Haley J.E., Krein D.M., Burke A.R., Flikkema J.L., Cooper T.M., “Relation between Two-Photon Absorption and Dipolar Properties in a Series of Fluorenyl-Based Chromophores with Electron Donating or Electron Withdrawing Substituents”, *J. Phys. Chem. A*, vol. 115, 2011, 4255-4262.
 - 23) Makarov N.S., Campo J., Hales J.M., Perry J.W., “Rapid, broadband two-photon-excited fluorescence spectroscopy and its application to red-emitting secondary reference compounds”, *Opt. Mater. Expr.*, vol. 1, 2011, 551-563.
 - 24) Tillo S.E., Hughes T.E., Makarov N.S., Rebane A., Drobizhev M., “A new approach to dual-color two-photon microscopy with fluorescent proteins”, *BMC Biotech.*, vol. 10:6, 2010, <http://www.biomedcentral.com/1472-6750/10/6>.
 - 25) Rebane A., Drobizhev M.A., Makarov N.S., Beuerman E., Nacke C., Pahapill J., “Modeling non-Lorentzian two-photon absorption line shape in dipolar chromophores”, *J. Luminescence*, vol. 130, 2010, 1055-1059.
 - 26) Rebane A., Drobizhev M.A., Makarov N.S., Beuerman E., Tillo S., Hughes T., “New all-optical method for measuring molecular permanent dipole moment difference using two-photon absorption spectroscopy”, *J. Luminescence*, vol. 130, 2010, 1619-1623.
 - 27) Kim K.-Y., Shelton A.H., Drobizhev M., Makarov N., Rebane A., Schanze K.S., “Optimizing simultaneous two-photon absorption and transient triplet-triplet absorption in platinum acetylide chromophores”, *J. Phys. Chem. A*, vol. 114, 2010, 7003-7013.
 - 28) Drobizhev M., Tillo S., Makarov N.S., Hughes T.E., Rebane A., “Absolute Two-Photon Absorption Spectra and Two-Photon Brightness of Orange and Red Fluorescent Proteins”, *J. Phys. Chem. B*, vol. 113, 2009, 855-859.
 - 29) Drobizhev M., Tillo S., Makarov N.S., Hughes T.E., Rebane A., “Color hues in red fluorescent proteins are due to internal quadratic Stark effect”, *J. Phys. Chem. B*, vol. 113,

- 2009, 12860-12864.
- 30) Kuimova M.K., Collins H.A., Balaz M., Dahlstedt E., Levitt J.A., Sergent N., Suhling K., Drobizhev M., Makarov N.S., Rebane A., Anderson H.L., Phillips D., "Photophysical properties and intracellular imaging of water-soluble porphyrin dimers for two-photon excited photodynamic therapy", *Org. Biomol. Chem.*, vol. 7, 2009, 889-896.
 - 31) Drobizhev M., Makarov N.S., Rebane A., de la Torre G., Torres T., "Strong two-photon absorption in push-pull phthalocyanines: role of resonance enhancement and permanent dipole moment change upon excitation", *J. Phys. Chem. C*, vol. 112, 2008, 848-859.
 - 32) Makarov N.S., Drobizhev M., Rebane A., "Two-photon absorption standards in the 550-1600 nm excitation wavelength range", *Opt. Expr.*, vol. 16, 2008, 4029-4047.
 - 33) Rebane A., Makarov N.S., Drobizhev M., Spangler B., Tarter E.S., Reeves B.D., Spangler C.W., Meng F., Suo Z., "Quantitative prediction of two-photon absorption cross section based on linear spectroscopic properties", *J. Phys. Chem. C*, vol. 112, 2008, 7997-8004.
 - 34) Rebane A., Drobizhev M., Makarov N.S., Koszarna B., Tasior M., Gryko D.T., "Two-photon absorption properties of meso-substituted A3-corroles", *Chem. Phys. Lett.*, vol. 462, 2008, 246-250.
 - 35) Drobizhev M., Makarov N.S., Rebane A., Wolleb H., Spahni H., "Very efficient two-photon induced photo-tautomerization in non-symmetrical phthalocyanines", *J. Luminescence*, vol. 128, 2008, 217-222.
 - 36) Drobizhev M., Makarov N.S., Hughes T., Rebane A., "Resonance Enhancement of Two-Photon Absorption in Fluorescent Proteins", *J. Phys. Chem. B*, vol. 111, 2007, 14051-14054.
 - 37) Rogers J.E., Slagle J.E., Krein D.M., Burke A.R., Hall B.C., Fratini A., McLean D.G., Fleitz P.A., Cooper T.M., Drobizhev M., Makarov N.S., Rebane A., Kim K.-Y., Farley R., Schanze K.S., "Platinum acetylide two-photon chromophores", *Inorganic Chem.*, vol. 46, 2007, 6483-6494.
 - 38) Makarov N.S., Rebane A., Drobizhev M., Wolleb H., Spahni H., "Optimizing two-photon absorption for volumetric optical data storage", *J. Opt. Soc. Am. B*, vol. 24, 2007, 1874-1885.
 - 39) Drobizhev M., Makarov N.S., Stepanenko Y., Rebane A., "Near-infrared two photon absorption in phthalocyanines: Enhancement of lowest gerade-gerade transition by symmetrical electron-accepting substitution", *J. Chem. Phys.*, vol. 124, 2006, 224701.
 - 40) Makarov N.S., Bepalov V.G., "Effective method of anti-Stokes generation by quasi-phase-matched stimulated Raman scattering", *J. Opt. Soc. Am. B*, vol. 22, 2005, 835-843.
 - 41) Makarov N.S., Bepalov V.G., "Multiwave quasi-phase-matched anti-Stokes stimulated Raman scattering", *J. Opt. A: Pure Appl. Opt.*, 5, 2003, S250-S255.
 - 42) Makarov N.S., Bepalov V.G., "Multiwave Stimulated Raman Scattering under Quasi-Phase-Matching Conditions", *Opt. & Spectr.*, vol. 95, 2003, 474-479.
 - 43) Makarov N.S., Bepalov V.G., "Quasi-phase matching generation of blue coherent radiation at stimulated Raman scattering", *Optics Communications*, vol. 203, 2002, 413-420.
 - 44) Makarov N.S., Bepalov V.G., "Combined Stokes-anti-Stokes Raman amplification in fiber", *izv. RAS, ser. fiz.* vol. 66, 2002, 350-352.
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1) Makarov N.S., "Two-photon absorption spectroscopy",
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1) Makarov N.S., "Ultrafast spectroscopy of organic molecules and semiconductor quantum dots: From basic science to applications", Saint-Petersburg National Research University of Information Technologies, Mechanics and Optics, July 8 2014.

2) Makarov N.S., "Quantitative measurements of ultrafast two-photon absorption", Department of Chemistry, New Mexico Highlands University, January 25 2013.

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- Invited talks:

1) Makarov N.S., Lin Q., McDaniel H., Velizhanin K.A., Cirloganu C.M., Padilha L.A., Koh W.-K., Fuke N., Robel I., Pietryga J.M., Klimov V.I., "Ultrafast spectroscopy helps optimize third-generation quantum dot solar cells", replaced by: Makarov N.S., Drobizhev M., Tillo S., Hughes T., Rebane A.K., "Ultrafast spectroscopy of fluorescent proteins: Searching the brightest probe", Laser Optics 2014, 30 June – 4 July 2014.

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- 2) Makarov N.S., McDaniel H., Robel I., Klimov V.I., “Ultrafast spectroscopy of CuInSeS colloidal quantum dots: Auger recombination, carrier multiplication, and electron transfer”, Optics&Photonics 2014, 17-21 August 2014.
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- 4) McDaniel H., Fuke N., Makarov N.S., Pietryga J.M., Klimov V.I., “An integrated approach to realizing high-performance liquid-junction quantum dot sensitized solar cells”, APS March Meeting, 3-7 March 2014.
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