CURRICULUM VITAE

PERSONAL DATA:

Name: Mikhail Shuba

Date of Birth 1978

Place of Birth the Russian Federation

Nationality: Belarusian

Marital Status: Married

Home Address: Pravda av., 16-8, 220116 Minsk, Belarus

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EDUCATION:

- 1995 – 2000, Gomel State University, Physical department, Subject of examination: optics.
- 2000 – 2003, Gomel State University, Physical department, Ph. D. Student.
- Ph.D. in Physics (Candidate of Science in Phys. and Math.), 2003, Gomel State University, Gomel, Belarus. Thesis title: "Polarization and energetic transformation of light in anisotropic periodic media".

EXPERIENCE:

10/2003 – present (Senior Researcher). Laboratory of nanoelectromagnetics, Institute for Nuclear Problems, Belarus State University, Minsk, Belarus

Institut fuer Festkoerperphysik, Technische Universitat Berlin, Berlin, Germany.
01/06/2008 – 30/06/2008; 01/06/2010 – 30/06/2010; 01/06/2011 – 30/06/2011, 01/07/2012 – 31/07/2012, 01/08/2013 – 31/08/2013, 01/07/2014 – 31/07/2014 (Visiting Scientist)

Institute of Physics of National Academy of Sciences, Kiev, Ukraine
06/12/2010 – 13/12/2010, 14/02/2011 – 21/02/2011

Semiconductor Physics Institute, Vilnius, Lithuania
05/11/2010-18/11/2010, 17/01/2011-22/01/2011

Rīgas Tehniskā universitāte, Polimērmateriālu institūts, Riga, Latvia
1/12/2012-15/12/2012

Frascati National Laboratory, National Institute of Nuclear Physics, Italy
1/04/2014-30/04/2014, 1/04/2016-30/04/2016, 01/04/2017-30/04/2017

Pennsylvania State University, US
01/08/2014-31/09/2014, 01/06/2015-31/07/2015

Tel-Aviv University, Tel-Aviv, Israel,
22/10/2015-26/11/2015; 20/12/2016-31/01/2017

University of Rome Tor Vergata, Rome, Italy
28/11/2015-26/12/2015; 26/03/2016-30/04/2016; 04/11/2016-11/12/2016; 13/03/2017-30/03/2017

INTERNATIONAL RESEARCH GRANTS:

- **Optical properties of carbon nanotube based composite medium,** World Federation of Scientists, National Scholarship Program in the frame of the topic “Science and Technologies for Developing Countries”, 2008. Grant holder M. Shuba under supervision of S.A. Maksimenko.

- **Terahertz applications of carbon nanotubes,** within the Framework of bilateral RB-FRG scientific-technical cooperation (IB BMBF), project number BLR 08/001, Project leaders: Prof. Ch. Thomsen (Institut fuer Festkoerperphysik, TUB, Berlin, Germany), S.A. Maksimenko (INP, Minsk, Belarus), 2008-2010.
- **Electromagnetic response properties of carbon onions and carbon onion-based composites,** from the INTAS, 2006-2008, Ref. Nr 06-1000013-9225, Project coordinator: Prof. Ph. Lambin (Namur, Belgium).
- **Nanocarbon based composite materials for electromagnetic applications,** from ISTC project B-1708, 2009-2012, Project manager S.A.Maksimenko, participants: A. Gusinskii (BSUIR, Belarus) I. Larionova (Biysk, Russia), V.L. Kuznetsov (Novosibirsk, Russia), A. Okotrub (Novosibirsk, Russia); collaborators: O. Shenderova (Raleigh, USA), Ph. Lambin (Namur, Belgium)
- **Nano carbon based components and materials for high frequency electronics,** EU FP7 CACOMEL project FP7-247007, Call ID "**FP7-PEOPLE-2009-IRSES**", 2010-2014, Coordinator: Prof. Ch. Thomsen (Institut fuer Festkoerperphysik, TUB, Berlin, Germany)
- **Carbon nanotubes based composite materials for electromagnetic shielding in microwaves,** Collaborative Linkage Grant under project CBP.EAP.CLG 983910, 2010-2011, Principal Researchers: J. Banis, (Vilnius, Lithuania) and S.A. Maksimenko.
- **Institutional Development of Applied Nanoelectromagnetics: Belarus in ERA Widening,** EU FP7 BY-NanoERA project FP7-266529, Call ID FP7-INCO-2010-6, 2010-2013. Coordinator Prof. S. Maksimenko.
- **Carbon-nanotube-based terahertz-to-optics rectenna,** EU FP7 project FP7-612285 CANTOR, Call ID FP7-PEOPLE-2013-IRSES, 2013-2017, Principal Researcher: M. Portnoi (University of Exeter, UK), team leaders S. Maksimenko (INP BSU), G. Slepyan (Tel Aviv University, Israel)
- **Nano-Thin and Micro-Sized Carbons: Toward Electromagnetic Compatibility Application,** project FP7-610875 NAMICEMC, Call ID FP7-PEOPLE-2013-IRSES, 2013-2017, Principal Researcher: A. Celzard (ENSTIB, Universite de Lorraine, Epinal, Franse), team leaders: S. Bellucci (Istituto Nazionale di Fisica Nucleare, Frascati, Italia), P. Kuzhir (INP BSU).

MEMBERSHIP OF PROFESSIONAL SOCIETIES

- Belarus Physical Society
- World Federation of Scientists

- **HONOURS, AWARDS, FELLOWSHIPS**
- Doctoral fellowship of the Government of the Republic of Belarus (2003).
- The fellowship of the President of the Republic of Belarus for talented young scientists. (2008 and 2014)
- The fellowship of the World Federation of Scientists in the frame of the topic "Science and Technologies for Developing Countries" (2008).
- Certificate of appreciation awarded to Mikhail Shuba for achievements in professional work and teaching presented by Belarus State University (2012).
- Belarus State University Award named by Academician A.N. Sevchenko for young scientists (2013)

Scientific Publications:

- 1 contributed chapter to book.
- 44 *peer-reviewed* scientific articles
- 19 articles in the International Conference Proceedings
- 720 citations, h-factor **13** (Scopus)

CURRENT RESEARCH ACTIVITY:

- Wave scattering by an isolated finite-length carbon nanotubes has been analysed. The potential of isolated CNTs as infrared and terahertz nanoantennas has been established; (2006);
- Wave scattering by an isolated finite-length bundle of carbon nanotubes has been analysed. The potential of bundle of carbon nanotubes as infrared and terahertz nanowaveguide and nanoantennas has been established. The analysis has been extended to multi-wall CNTs. (2007-2009)
- The theory of electromagnetic wave scattering by several finite length CNT configurations, including singlewall CNT's having a surfactant coating, CNT bundles, and multiwall CNT was presented in radio

frequency and microwave ranges. The application of CNT for far-infrared and terahertz range thermolysis of cancer cells was theoretically studied (2010-2012).

- A model for the effective conductivity of a dilute and disordered composite material containing randomly single-wall carbon nanotube inclusions was formulated. The correct interpretation of the dependences of the effective conductivity on the frequency and temperature has been given. (2010).
- Electromagnetic response of composite media based on the doped CNT was calculated. The influence of the doping effect on optical parameters of the composite was reported (2010).
- The first experimental evidence of localized plasmon resonance in composite materials containing single-wall carbon nanotubes has been reported. (2012).
- The optimized cutting approach based on low temperature intensive ultrasonication in a mixture of sulfuric and nitric acids. The method leads to the reduction of SWCNTs length from 1000 nm to 50-200 nm with minimal carbon loss and weak disturbance of electronic properties of SWCNTs (2012).
- The peculiarities of the permittivity spectra of multi-walled CNT-based composites in the microwave and terahertz ranges have been theoretically explained (2013)
- Temperature dependence of the infrared absorbance spectra of SWCNT film has been shown and explained (2016).
- Experimental and theoretical justification has been given to show that short-length CNTs can be considered as building blocks for high-dielectric constant material in the terahertz range (2017).

SPOKEN LANGUAGES: Russian, English.

INVITED TALKS:

1. M. V. Shuba, S. A. Maksimenko, Interaction of carbon nanotubes with terahertz radiation, NoTeDev Workshop on Terahertz Technology, 21-24 September, 2016, Prague, Czech Republic.

PUBLICATIONS

Books:

1. S. A. Maksimenko, G. Ya. Slepyan, K. G. Batrakov, A.A. Khrushchinsky, P.P. Kuzhir, A. M. Nemilentsau, and M. V. Shuba, Electromagnetic waves in carbon nanostructures, in: "Carbon Nanotubes and Related Structures". Editors: V. Blank and B. Kulnitskiy, Research Signpost Publisher (2008), pp. 147-187.

Selected Papers,

1. **M.V. Shuba**, A. Paddubskaya, P.P. Kuzhir, S.M. Maksimenko, E. Flahaut, V. Fierro, A. Celzard, G. Valusis, Short-length carbon nanotubes as building blocks for high dielectric constant materials in the terahertz range, 2016 ***J. Phys. D: Appl. Phys.*** https://doi.org/10.1088/1361-6463/aa5628
2. M.V. **Shuba**, A. Lakhtakia, Splitting of absorptance peaks in absorbing multilayer backed by a periodically corrugated metallic reflector, **JOSA A** 33 (4), 779-784 (2016)
3. L Liu, G.D. Barber, M.V **Shuba**, Y. Yuwen, A. Lakhtakia, T.E. Mallouk, T. S. Mayer, Planar Light Concentration in Micro-Si Solar Cells Enabled by a Metallic Grating–Photonic Crystal Architecture, **ACS Photonics** 3 (4), 604-610
4. A. Paddubskaya, **M. Shuba**, G. Valusis, P. Kuzhir, S. Maksimenko, A. Okotrub, E. Flahaut, A.M. Galibert, B. Soula, V. Fierro, and A. Celzard, Coating in microwave frequency range, **Lithuanian Journal of Physics,** Vol. 56, No. 2, pp. 67–72 (2016).
5. **M. V. Shuba**, A. G. Paddubskaya, P. P. Kuzhir, S. A. Maksimenko, G. Valusis, N. A. Poklonski, S. Bellucci, G. Kenanakis, and M. Kafesaki, Temperature induced modification of the mid-infrared response of single-walled carbon nanotubes, **J. of Appl. Phys.** 119, 104303 (2016).
6. **M. V. Shuba,** M. Faryad, M. E Solano, P. B Monk, A. Lakhtakia, Adequacy of the rigorous coupled-wave approach for thin-film silicon solar cells with periodically corrugated metallic backreflectors: spectral analysis, **JOSA A**, V. 32, pp. 1222-1230 (2015).
7. V. Baryshevsky, N. Belous, A. Gurinovich, E. Gurnevich, P. Kuzhir, S. Maksimenko, P. Molchanov, **M. Shuba**, V. Roddatis, T. Kaplas, Y. Svirko, Study of nanometric thin pyrolytic carbon films for explosive electron emission cathode in high-voltage planar diode, **Thin Solid Film**, Vol. 581, pp. 107-111 (2015).
8. V. Ksenevich, **M. Shuba**, A. Paddubskaya, Electrical Transport and Magnetoresistance in Single-Wall Carbon Nanotubes Films, **Materials Science**, V. 20, pages 126-128 (2014).

9. D. Bychanok, **M Shuba**, P. Kuzhir, S. Maksimenko, V. Kubarev, M. Kanygin, O. Sedelnikova, L. Bulusheva, and A. Okotrub "Anisotropic electromagnetic properties of polymer composites containing oriented multiwall carbon nanotubes in respect to terahertz polarizer applications", ***J. Applied Physics*****,** 114, 114304 (2013).
10. J. Macutkevic, P. Kuzhir, A. Paddubskaya, **M. Shuba**, J. Banys, S. Maksimenko, V. L. Kuznetsov, I. N. Mazov and D. V. Krasnikov, Influence of carbon nanotubes diameters on composite dielectric properties, ***Phys. stat. sol. (a),*** Volume 210, Issue 11, November 2013, Pages: 2491–2498.
11. **M.V. Shuba**, A.V. Melnikov, A.V. Paddubskaya, P.P. Kuzhir, S.A. Maksimenko, C. Thomsen, The role of finite size effects in the microwave and sub-terahertz electromagnetic response of multiwall carbon nanotube based composite: theory and interpretation of experiment // ***Phys. Rev. B*** *88,* 045436 (2013).
12. D. Seliuta, L. Subacius, I. Kasalynas, **M. Shuba**, A. Paddubskaya, V. Ksenevich, P. Kuzhir, S. Maksimenko, and G. Valusis, Electrical conductivity of single-wall carbon nanotube films in strong electric field, ***J. Appl. Phys.*** 113, 183719 (2013).
13. P. P. Kuzhir, A. G. Paddubskaya, **M. V. Shuba**, S. A. Maksimenko, A. Celzard, V. Fierro, G. Amaral-Labat, A. Pizzi, G. Valušis, J. Macutkevic, M. Ivanov, J. Banys, S. Bistarelli, A. Cataldo Electromagnetic shielding efficiency in Ka-band: carbon foam versus epoxy/carbon nanotube composites // ***Journal of Nanophotonics***, Vol. 6, 061715 (2012)
14. D. Li , H. Kim, D. Geller, S. Patch, **M. Shuba,** S. Maksimenko, Hanson, G. The effect of sample holder geometry on electromagnetic heating of nanoparticle and NaCl solutions at 13.56 MHz, ***IEEE Transactions on Biomedical Engineering***, Vol. 59, 3468-3474 (2012).
15. **M. V. Shuba**, A. G. Paddubskaya, P. P. Kuzhir, S. A. Maksimenko, V. Ksenevich, G. Niaura, D. Seliuta, I. Kašalynas, G. Valusis, Soft cutting of single-wall carbon nanotubes by low temperature ultrasonication in a mixture of sulfuric and nitric acids, ***Nanotechnology*****,** Vol. 23, 495714 (2012).
16. **M. V. Shuba**, A. G. Paddubskaya, P. P. Kuzhir, G. Ya. Slepyan, D. Seliuta, I. Kašalynas, G. Valusis, A. Lakhtakia, Effects of inclusion dimensions and p-type doping in the terahertz spectra of composite materials containing bundles of single-wall carbon nanotubes, ***Journal of Nanophotonics***, Vol. 6, 061707 (2012).
17. J. Macutkevic, D. Seliuta, G. Valusis, R. Adomavicius, P. Kuzhir, A. Paddubskaya, **M. Shuba**, S. Maksimenko, L. Coderoni, F. Micciulla, I. Sacco and S. Bellucci, Terahertz time domain spectroscopy of epoxy resin composite with various carbon inclusions, ***Chemical Physics*****,** vol. 404**,** P. 129–135 (2012).
18. **M.V. Shuba**, D. Seliuta, P.P. Kuzhir, S.A. Maksimenko, V.K. Ksenevich, I. Kašalynas, J. Macutkevič, G. Valušis. Antenna resonances in terahertz photoconductivity of single wall carbon nanotube fibers, ***Diamond & Related Materials*****,** vol. 27–28, pp 36-39 (2012).
19. **M. V. Shuba**, A. G. Paddubskaya, P. P. Kuzhir, G. Ya. Slepyan, S. A. Maksimenko, V. K. Ksenevich, P. Buka, D. Seliuta, I. Kasalynas, J. Macutkevic, G. Valusis, C. Thomsen, A. Lakhtakia, Experimental evidence of localized plasmon resonance in composite materials containing single-wall carbon nanotubes, ***Phys. Rev. B*** 85, 165435 (2012).
20. **M. V. Shuba**, G. Ya. Slepyan, S. A. Maksimenko, and G. W. Hanson, RF and microwave electrical response of carbon nanotube saline solutions for potential biomedical applications, ***Nanosci. Nanotechnol. Lett.*** 3, No. 6, 885-888 (2011).
21. P. Kuzhir, V. Ksenevich, A. Paddubskaya, T. Veselova, D. Bychanok, A. Plusch, A. Nemilentsau, **M. Shuba**, S. Maksimenko, S. Bellucci, L. Coderoni, F. Micciulla, I. Sacco, G. Rinaldi, CNT based epoxy resin composites for conductive applications, ***Nanosci. Nanotechnol. Lett.,*** 3(6), 889-894 (2011)**.**
22. D. S. Bychanok, M. A. Kanygin, A. V. Okotrub, **M. V. Shuba**, A. G. Paddubskaya, A. O. Plyushch, P. P. Kuzhir, S. A. Maksimenko, Anisotropy of the Electromagnetic Properties of Polymer Composites Based on Multiwall Carbon Nanotubes in the Gigahertz Frequency Range, ***JETP Letters*****,** 93 (10), 607–611 (2011)
23. P. Kuzhir, A. Paddubskaya, D. Bychanok, A. Nemilentsau, **M. Shuba**, A. Plusch, S. Maksimenko, S. Bellucci, L. Coderoni, F. Micciulla, I. Sacco, G. Rinaldi, J. Macutkevic, D. Seliuta, G. Valusis, J. Banys, Microwave probing of nanocarbon based epoxy resin composite films: toward electromagnetic shielding, ***Thin Solid Films*****,** 519(12), 4114-4118 (2011).
24. A. M. Nemilentsau, M. V. Shuba, G. Ya. Slepyan, P. P. Kuzhir, S. A. Maksimenko, P. N. D'yachkov, A. Lakhtakia, Substitutional doping of carbon nanotubes to control their electromagnetic characteristics, ***Phys. Rev. B*** 82, 235424 (2010).
25. M.V. Shuba, G. Y. Slepyan, S. A. Maksimenko, and G.W. Hanson, Radiofrequency field absorption by carbon nanotubes embedded in a conductive host, **J. Appl. Phys.** 108(11) 114302 (2010).
26. D. Seliuta, I. Kašalynas, J. Macutkevic, G. Valušis, **M.V. Shuba**, P.P. Kuzhir, G.Y. Slepyan, S.A. Maksimenko, V. Ksenevich, V. Samuilov, and Q. Lu, Terahertz sensing with carbon nanotube layers coated on silica fibers: Carrier transport versus nanoantenna effects, ***Appl. Phys. Lett.*** 97, 073116 (2010).
27. A M Nemilentsau, **M V Shuba**, P N D'yachkov, G Ya Slepyan, P P Kuzhir and S A Maksimenko, Electromagnetic response of the composites containing chemically modified carbon nanotubes, ***J. Phys.: Conf. Ser.*** 248, 012003 (1-6) (2010)

28. G.Ya. Slepyan, **M. V. Shuba**, S. A. Maksimenko, C. Thomsen, and A. Lakhtakia, Terahertz conductivity peak in composite materials containing carbon nanotubes: Theory and interpretation of experiment, ***Phys. Rev. B*** 81, 205423 (2010).
29. Burlaka, S. Lukin, S. Prylutska, O. Remeniak, Yu. Prylutskyy, **M. Shuba**, S. Maksimenko, U. Ritter, P. Scharff, Hyperthermic Effect Of Multi-Walled Carbon Nanotubes Stimulated With Near Infrared Irradiationfor Anticancer Therapy: In Vitro Studies, ***Experimental Oncology 32***(1), 48-50 (2010).
30. **M.V. Shuba**, G.Ya. Slepyan, S.A. Maksimenko, C. Thomsen, A. Lakhtakia, Theory of multiwall carbon nanotubes as waveguides and antennas in the infrared and the visible regimes, ***Phys. Rev. B* 79**, 155403 (2009).
31. **M. V. Shuba**, S. A. Maksimenko and G. Ya. Slepyan, Absorption Cross-Section and Near-Field Enhancement in Finite-Length Carbon Nanotubes in the Terahertz-to-Optical Range, ***J. Comput. Theor. Nanoscience,*** 6(9)**,** 2016-2023 (2009).
32. S. A. Maksimenko, G. Ya. Slepyan, A. M. Nemilentsau, and **M. V. Shuba**, Carbon nanotube antenna: Far-field, near-field and thermal-noise properties, ***Physica E*** 40(7) 2360-2364 (2008).
33. **M.V. Shuba**, S.A. Maksimenko and A. Lakhtakia, Electromagnetic wave propagation in an almost circular bundle of closely packed, metallic, carbon nanotubes, ***Phys. Rev. B*** 76, 155407 (2007).
34. G. Ya. Slepyan, **M. V. Shuba**, S. A. Maksimenko, and A. Lakhtakia, Theory of optical scattering by achiral carbon nanotubes and their potential as optical nanoantennas, ***Phys. Rev. B*** 73, 195416 (2006).
35. S. N. Kurilkina and **M. V. Shuba**, Peculiarities of light transformation in finite three-layered periodical structures with regular arrangement of defect layers, ***Proceedings of the Russian Academy of Sciences, Phys. ser.*****,** V. 68, N. 12, pp. 1730-1734 (2005).
36. S. N. Kurilkina and **M. V. Shuba**, Specific Features of Light Propagation in a Periodic three-layered structure with regular arrangement of defect layers, ***Bulletin of the Russian Academy of Sciences: Physical series,*** Vol. 68, No. 12, 1730-1735 (2004).
37. S. N. Kurilkina and **M. V. Shuba**, Intermediate regime for the diffraction of light by ultrasound in cubic crystals with electrically induced anisotropy, ***J. Opt. Technol***. *70*, 408-409 (2003).
38. S. N. Kurilkina and **M. V. Shuba**, Specific Features of Light Propagation in a Periodic Structure with Regular Arrangement of Defect Layers, ***Opt. Spectrosc***. 94, 418-422 (2003).
39. S. N. Kurilkina and **M. V. Shuba**, Enhancement of the Kerr Rotation in Magnetically Active Periodic Structures, ***Crystallography Report***. 48, № 3, 549-553 (2003).
40. S. N. Kurilkina and **M. V. Shuba**, Enhancement of the Faraday Rotation in Magnetically Active Periodic Structures with Defects, ***Opt. Spectrosc.*** 93, 918-922 (2002).
41. S. N. Kurilkina and **M. V. Shuba**, Propagation and Transformation of Light Waves in Magnetically Active Periodic Structures, ***Opt. Spectrosc***. 93, 913-917 (2002).
42. S. N. Kurilkina and **M. V. Shuba**, Specific Features of Light Propagation in Periodic Structures with Natural and Electric-Field-Induced Anisotropy, ***Opt. Spectrosc. 93***, 908-912 (2002).
43. S. N. Kurilkina and **M. V. Shuba**, Nonreciprocal Effects in the Acousto-Optical Interaction in Gyrotropic Cubic Crystals with Electroinduced Anisotropy, ***Opt. Spectrosc***. ***92***, 263-267 (2002).
44. S. N. Kurilkina and **M. V. Shuba**, Nonreciprocal Effects in the Acousto-Optical Interaction in Gyrotropic Cubic Crystals with Electroinduced Anisotropy, ***Ukrainian J. Phys. Optics*****. 2**, № 4, P. 159 - 164 (2001).