Dr. Alina Karabchevsky January, 2019

CURRICULUM VITAE

• Personal Details

Name:	Alina Karabchevsky
Address and telephone number at work:	Electrooptical and Photonics Engineering Unit Ben-Gurion University of the Negev Room 207, Building 41, The Marcus Family Campus P.O. Box 653, Beer-Sheva 8410501, Israel Tel: 972-8-6479720
Place of birth	Vinnitsa, Soviet Ukraine (USSR)
Date of immigration	23 December 1993
Address and telephone number at home	Iris 10, Lehavim 8533800 Israel Tel: 972-53-2232299

• Education

B.Sc – 2001-2005 – University of Ben-Gurion, Biomedical Engineering.

M.Sc – 2006-2008 – University of Ben-Gurion, Biomedical Engineering
Name of advisor: Dr. Ofer Levi
Title of dissertation: '*Development of algorithms for physiological signal processing*'

Ph.D. – 2008-2012 University of Ben-Gurion, Electrooptical Engineering Unit
Name of advisor: Prof. Ibrahim Abdulhalim
Title of thesis: '*Nanophotonic structures for optical biosensing and application in water quality control*'. Nominated for an excellent thesis award.

• Employment History

Tenured Senior Lecturer
2018-Present: Department of Electrooptics and Photonics Engineering, BGU, IL.

Lecturer
2015-2018: Electrooptical Engineering Unit, BGU, IL.

Research fellow
2012-2015: Optoelectronics Research Center, University of Southampton, UK.

External Lecturer
2011-2012: Electrooptical Engineering Unit, BGU, IL.

External Lecturer
2008-2011: Department of Electrical and Electronic Engineering, ORT Braude College, Carmiel, IL.

Lab Instructor
2009-2011: Electrooptical Engineering Unit, BGU, IL.

Teaching Assistant
2007-2008: Department of Industrial Engineering and Management, Achva Academic College, IL.

Teaching Assistant
2006-2008: Department of Industrial Engineering and Management, BGU, IL.

Teaching Assistant
2006-2008: Flight Academy, IL.

Teaching Assistant
2005-2006: Department of Biomedical Engineering, BGU, IL.

• **Professional Activities**

(b) Professional functions outside universities/institutions (inter-university, national, international)

Apr. 2018 – Initiation of Mutual agreement of scientific and academic collaboration (MoU) between BGU and Belarussian State University (Belorussia).

Jun. 2017 – Establishing the International joint PhD program between BGU and Vladimir State University[1] (Russian Federation).

Jun. 2017 – Initiation of Mutual agreement of scientific and academic collaboration (MoU) between BGU and Belarussian State University (Minsk, Belorussia).

Mar. 2017 – Initiation of Mutual agreement of scientific and academic collaboration (MoU) between BGU and MiSIS[2] (Russian Federation).

Mar. 2017 – Establishing the International joint PhD program between BGU and National University of Science and Technology MiSIS[2] (Russian Federation).

Mar. 2017 – Initiation of Mutual agreement of scientific and academic collaboration (MoU) between BGU and Russian Quantum Center.

Oct. 2016 – Establishing the International joint PhD program between BGU and ITMO[3] University (Russian Federation) which is one Russia's leading higher education and research institutions, specializing in Information Technology, Optical Design and Engineering.

Oct. 2016 – Initiation of Mutual agreement of scientific and academic collaboration (MoU) between BGU and ITMO[3] (Russian Federation).

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[1] Vladimir State University (VLSU), Vladimir, Russian Federation.

[2] National University of Science and Technology MISiS, Moscow, Russian Federation.

[3] ITMO University (Saint-Petersburg National Research University of Information Technologies, Mechanics and Optics), Saint Petersburg, Russian Federation.

Mar. 2016 – Organization of Brokerage event: Photonics mission to Israel of leading UK scientists (sponsored by British embassy in Israel).

(e) Ad-hoc reviewer for journals
Light Science and Applications, Optics Express, Optics Letters, Applied Optics, Biosensors and Bioelectronics, Journal of Nanophotonics.

(f) Membership in professional/scientific societies

November 2017 – Advisor to SPIE student chapter at BGU

April 2016 – SPIE member

Nov. 2010 – OSA member

Feb. 2010 - Dec. 2011 - President of the SPIE BGU student chapter

Nov. 2010 - Organizer of SPIE students chapter at BGU, the first in the Middle East.

• Educational activities

(a) Courses taught

1. Integrated Photonics, Lecturer, Graduate level, Electrooptical Engineering Unit, BGU, IL. New course.
2. Fiber Optics for Optical Communication, Lecturer, Graduate level, Electrooptical Engineering Unit, BGU, IL.
3. Integrated Optics for Optical Communication, External Lecturer, Graduate level, Electrooptical Engineering Unit, BGU, IL.
4. Introduction to Digital Signal Processing, External Lecturer, Undergraduate level, Department of Electrical and Electronic Engineering, ORT Braude College, Carmiel, IL.
5. Electrooptical Laboratory, Instructor, Graduate level, Electrooptical Engineering Unit, BGU, IL.
6. Laboratory of Optics and Photonics, Instructor, Graduate level, Electrooptical Engineering Unit, BGU, IL.
7. Operating Research, Teaching assistance, Undergraduate level, Department of Industrial Engineering and Management, Achva Academic Collage, IL.
8. Operating Research, Teaching assistance, Undergraduate level, Flight Academy, IL.
9. Operating Research, Teaching assistance, Undergraduate level, Department of Industrial Engineering and Management, BGU, IL.
10. Introduction to Image Processing, Graduate level, Department of Industrial Engineering and Management, BGU, IL.
11. Introduction to Biomedical Signal Processing, Undergraduate level, Department of Biomedical Engineering, BGU, IL.

(b) Research students

Graduated students:
Ali Mosayyebi – MSc, University of Southampton, jointly supervised with Prof. James S Wilkinson, year of graduation 2014.
Aviad Katiyi, MSc, Ben-Gurion University of the Negev, year of graduation 2017.

Current **Post-Docs** students:
2019 – Dr. Eran Falek, Post-doc, Ben-Gurion University of the Negev. Project entitled 'Light-manipulation at nanoscale'.

Current **PhD** students:
2017 –Aviad Katiyi, PhD student, Ben-Gurion University of the Negev, thesis entitled: 'Optical waveguides for sensing applications', expected graduation year 2021.
2017 –Daler Dadadzhanov– joint PhD student, Ben-Gurion University of the Negev (co-supervisor Tigran Vartanyan ITMO[3] University), thesis entitled: 'Optical nanoantennas for applications in label-free chemical and biological sensors', expected graduation year 2020.
2017 –Yuriy Artemyev – joint PhD student, Ben-Gurion University of the Negev (co-supervisor Alexander Shalin ITMO[3] University), thesis entitled: 'Random antireflective subwavelength structures on waveguides', expected graduation year 2020.
2017 – Pavel Terekhov – joint PhD student, Ben-Gurion University of the Negev (co-supervisor Alexander Shalin ITMO[3] University), thesis entitled: 'Light manipulation with all dielectric metasurfaces made of high refractive index nanoparticles which support multipoles of second and third orders', expected graduation year 2020.
2017 –Angeelene Ang – joint PhD student, Ben-Gurion University of the Negev (co-supervisor Alexander Shalin ITMO[3] University), thesis entitled: 'Tailoring Optical Forces through Electromagnetic Field Manipulation Using Auxiliary Structures', expected graduation year 2021.

Current **MSc** students:
Yakov Galutin, MSc student, Ben-Gurion University of the Negev, thesis entitled: 'Integrated Photonics in Sub-wavelength Regime', expected graduation year 2019.

Current **BSc** project students:
Yarden Tzabari, BSc student, Shamoon College of Engineering, project entitled: 'Multipole excitation in sub-wavelength particles on optical waveguide', expected graduation year 2019.
Kobi Harush, BSc student, Shamoon College of Engineering, project entitled: 'Multipole excitation in sub-wavelength particles on optical waveguide', expected graduation year 2019.
Michael Elman, BSc student, Shamoon College of Engineering, project entitled: 'Phase accumulation in all-dielectric metamaterials', expected graduation year 2019.
Yakov Keren, BSc student, Shamoon College of Engineering, project entitled: 'Phase accumulation in all-dielectric metamaterials', expected graduation year 2019.

Adir Hazan, BSc student, Shamoon College of Engineering, project entitled: 'SPR sensors in wavelength interrogation', expected graduation year 2019.

• **Awards, Citations, Honors, Fellowships**

(a) Honors, Citation Awards (including during studies)

Year 2014 – Optoelectronics Research Centre, University of Southampton, UK – 'Brilliance in Research' Prize – 1K£, Prof. Sir. Dave N Payne.

Year 2012, - Ben-Gurion University of the Negev – 45K$- President's Award 'Outstanding Woman in Science'.

Year 2011 SPIE Optics and Photonics Conference, San Diego, Proc. SPIE, 8104– 20(2011). Best paper award.

Year 2011 SPIE Optics and Photonics Conference, San Diego, USA. Best Lecture award.

Year 2010 NanoIsrael Conference 2010, Tel-Aviv Israel, 8-9 Nov 2010. Best Poster award.

• **Scientific Publications**

a) H-index of 10(ISI), H-index of 13(GS).
b) Total number of citations: 270 (ISI), 432 (GS).
c) Total number of citations without self-citations 263 (ISI).

(c) Refereed chapters in collective volumes

1) **A. Karabchevsky**[S] and I. Abdulhalim[PI] (2015) 'Techniques for signal analysis in surface plasmon resonance sensors', edited by I. Abdulhalim and R. S. Marks- Volume title: 'Nanomaterials for Water Management Signal Amplification for Biosensing from Nanostructures', Publisher - Pan Stanford Series on the High-Tech of Biotechnology [ISBN 9789814463478 -CAT N11160].

Conference proceedings

1) I. Abdulhalim[PI], **A. Karabchevsky**[S], C. Patzig[S], B. Rauschenbach[C], B. Fuhrmann[C], 'Comparative study of enhanced fluorescence from nano sculptured thin films', SPIE Optics and Photonics, San Diego 2008, Proc. SPIE, Vol. 7041, 70410G (2008).
2) **A. Karabchevsky**[S], L. Tsapovsky[S], R. S. Marks[C], I. Abdulhalim[PI], 'Optical immunosensor for endocrine disruptor nanolayer detection by surface plasmon resonance imaging', SPIE Optics and Photonics, San Diego 2011, Proc. SPIE, 8099 - 32 (2011).
3) **A. Karabchevsky**[S], C. Patzig[S], B. Rauschenbach[C], I. Abdulhalim[PI], 'Microspot surface enhanced fluorescence from sculptured thin films for control of antibody immobilization', SPIE Optics and Photonics, San Diego 2011, Proc. SPIE, 8104 - 20 (2011). Best paper award.
4) **A. Karabchevsky**, A. Shalabney[C], 'Strong interaction of molecular vibrational overtones with near-guided surface plasmon polariton', SPIE Photonics Europe, Brussels, Proc. SPIE, 9899 (2016).

5) **A. Karabchevsky**[PI], Y. Gorodetski[C], 'Plasmonic rac-and-pinion gear with chiral metasurfaces', SPIE Photonics Europe, Brussels, Proc. SPIE, Vol. 9883, 9883H (2016).
6) **A. Karabchevsky**[PI], 'Glowing microfluidics without external light source', Proceedings of the 34th Israeli Conference of Mechanical Engineering, Faculty of Mechanical Engineering, Technion I.I.T, Haifa, 22-23 November 2016.
7) P. D. Terekhov[S], K. V. Baryshnikova[PD], Y. A. Artemyev[S], A. S. Shalin[C], A. B. Evlyukhin[C], **A. Karabchevsky**[PI], 'Multipole optical response of a silicon nanocones', Proceedings of the International Conference Days on Diffraction 2017, St Petersburg, Russia.
8) Y. Galutin[S], E. Falek[S], **A. Karabchevsky**[PI], 'Invisibility Cloak Scheme with Composite Plasmonic Waveguides and Metsurface Overlayers', Proceedings of the Progress In Electromagnetics Research Symposium, St Petersburg, Russia, (2017).
9) P. D. Terekhov[S], K. V. Baryshnikova[PD], A. S. Shalin[C], A. B. Evlyukhin[C], **A. Karabchevsky**[PI], 'Toroidal Dipole Associated Resonant Forward Scattering of Light by Silicon Nanoparticles', Proceedings of the Progress In Electromagnetics Research Symposium, St Petersburg, Russia, (2017).
10) P. D. Terekhov[S], K. V. Baryshnikova[PD], Y. A. Artemyev[S], **A. Karabchevsky**[PI], A. S. Shalin[C], A. B. Evlyukhin[C], 'Optical multipole resonances of non-spherical silicon nanoparticles and the influence of illumination direction', SPIE Proceedings Volume 10528, Optical Components and Materials XV; 1052802 (2018) .
11) Dadadzhanov D.R., Vartanyan T.A.A., **Karabchevsky A**., 'Vibrational overtones spectroscopy enabled by plasmonic nanoantennas'. SPIE Nanoscience + Engineering. Plasmonics: Design, Materials, Fabrication, Characterization, and Applications XVI, (2018).
12) Novitsky, D., **Karabchevsky**, **A.**, Lavrinenko, A., Shalin, A.S., Novitsky, D., 2018, ' Light dynamics in PT-symmetric multilayers: Phase transition, nonreciprocity, and propagation direction locking', IOP Conf. Series: Journal of Physics: Conf. Series 1092 (2018) 012100 DOI:10.1088/1742-596/1092/1/0121002, (2018).

(d) Refereed articles and refereed letters in scientific journals

1)Abdulhalim[PI], I., **Karabchevsky**[S], **A.**, Patzig[S], C., Rauschenbach[PI], B., Fuhrmann[PI], B., Eltzov[S], E., Marks[PI], R. S., Xu[S], J., Zhang[S], F. and Lakhtakia[PI], A. 2009. Surface enhanced fluorescence from metal sculptured thin films with application to biosensing in water. Appl. Phys. Lett. 94: 063106. (60(GS), 46(ISI) citations; IF 2.67; 4/39; Q1).

2)Shalabney[S], A., Lakhtakia[PI], A., Abdulhalim[PI], I., Lahav[S], A., Patzig[S], C., Hazek[S], I., **Karabchevky**[S], **A.**, Rauschenbach[PI], B., Zhang[S], F., Xu[S], J. 2009. Surface plasmon resonance from metallic columnar thin films', Photonic. and Nanostruct., 7:176-185 (29(GS), 28(SI) citations; IF 1.8; 179/645; Q1).

3)**Karabchevsky**[S], **A.**, Krasnykov[S], O., Abdulhalim[PI], I., Hadad[C], B., Goldner[C], A., Auslender[C], M. and Hava[C], S. 2009. Metal grating on a substrate nanostructure for sensor applications. Photonic. and Nanostruct., 7:170-175 (24(GS), 23(ISI) citations; IF 1.8; 0. 179/645; Q1).

4)**Karabchevsky**[S], **A.**, Krasnykov[S], O., Auslender[C], M., Goldner[C], A., Hadad[C], B. and

Abdulhalim[PI], I. 2009. Theoretical and experimental investigation of enhanced transmission through periodic metal nanoslits for sensing in water environment. Plasmonics, 4: 281-292 (35(GS), 31(ISI) citations; IF 1.8; 95/232; Q1).

5)Krasnykov[S], O., **Karabchevsky**[S], **A.**, Shalabney[S], A., Auslender[C], M. and Abdulhalim[PI], I. 2011. Sensor with increased sensitivity based on enhanced optical transmission in the infrared. Opt. Commun., 28: 1435-1438. (16(GS), 15(ISI) citations; IF 1.65; 202/645; Q2).

6)**Karabchevsky**[S], **A.**, Karabchevsky[S], S., Abdulhalim[PI], I. 2011. Fast Surface Plasmon Resonance imaging sensor using Radon Transform. Sensor. Actuat. B-Chem., 155: 361-365. (22(GS), 19(ISI) citations; IF 5.07; 1/102; Q1).

7)**Karabchevsky**[S], **A.**, Karabchevsky[S], S., Abdulhalim[PI], I. 2011. Nano-precision algorithm for Surface Plasmon Resonance determination from images with poor contrast. J. Nanophoton. 5: 051813-051813-12. (21(GS), 12(ISI) citations; IF 1.652; 37/86; Q2).

8)**Karabchevsky**[S], **A.**, Auslender[C], M. and Abdulhalim[PI], I. 2011. Dual surface plasmon excitation at the interfaces of periodic thin metallic nanostructures. J. of Nanophoton. 5: 051821-051821-9. (14(GS), 10(ISI) citations; IF 1.17; 101/210; Q2).

9)**Karabchevsky**[S], **A.**, Khare[S], C., Patzig[S], C., Abdulhalim[PI], I., Rauschenbach[PI], B. 2012. Microspot sensing based on surface enhanced fluorescence from nano sculptured metallic thin films, J. of Nanophoton, 6:061508-1-061508-12. (17(GS), 6(ISI) citations; IF 1.17; 101/210; Q2).

10) **Karabchevsky**[S], **A.**, Tsapovsky[S], L., Marks[PI], R. and Abdulhalim[PI], I. 2013. Study of Immobilization Procedure on Silver Nanolayers and Detection of Estrone with Diverged Beam Surface Plasmon Resonance (SPR) Imaging. Biosensors, 3:157-170. (11(GS) citations; IF 2.83; 22/102; Q1).

11) **Karabchevsky**[PD], **A.**, Wilkinson[PI], J. S. and Zervas[C], M. N., 2015. Transmittance and surface intensity in 3D composite plasmonic waveguides. Opt. Express, 23:14407-4423. (7(GS), 6(ISI) citations; IF 3.48; 17/159; Q1).

12) ***Karabchevsky**[PI], **A.** and Kavokin[C], A. V. 2016. Giant absorption of light by molecular vibrations on a chip. Sci. Reports, 6:1-7. (8(GS), 6(ISI) citations; IF 4.63; 4/77; Q1).

13) ***Karabchevsky**[PI], A., Mosayyebi[S], A and Kavokin[C], A. V. 2016 Tuning chemiluminiscence flow by plasmonic nanoparticles, Light: Science and Applications, (12(GS), 10(ISI) citations; IF 14.098; 2/210; Q1).

14) *Terekhov[S], P. D., Baryshnikova[S], K.V., Shalin[PI], A. S., **Karabchevsky, A**[PI]. and Evlyukhin[C], A. B., 2017, 'Resonant forward scattering of light by high-refractive-index dielectric nanoparticles with toroidal dipole contribution', Opt. Lett, 42:4 835-838, (16(GS), 6(ISI) citations; IF 3.54; 16/159; Q1).

15) *Katiyi[S], A., **Karabchevsky**[PI], A., 2017. Figure of merit of all-dielectric waveguide structures for absorption overtone spectroscopy. Journal of Lightwave Technology, 35:14, 2902 – 2908, (2(GS), 2(ISI) citations; IF 3.87; 14/159; Q1).

16) *Terekhov[S], P. D., Baryshnikova[S], K.V., A. S., **Karabchevsky**[PI]**, A**, Shalin[PI], A. S. and Evlyukhin[C], A. B., 2017, 'Multipolar response of non-spherical silicon nanoparticles in the visible and near-infrared spectral ranges', Phys. Rev. B, 96:035443, 1-7, (12(GS), 11(ISI) citations; IF 3.836; 133/1196 in physics; Q1).

17) *Galutin[S], Y., Falek[S], E. and **Karabchevsky**[PI], **A.**, 2017, 'Invisibility Cloaking Scheme by Evanescent Fields Distortion on Composite Plasmonic Waveguides with Si Nano-Spacer'. DOI: 10.1038/s41598-017-10578-6, Nature Sci. Rep, (1(GS), 0(ISI) citations; IF 4.63; 4/77; Q1).

18) *Ospanova[S], A., **Karabchevsky[PI]**, A., Basharin[PI], A. A., 'Metamaterial Engineered Transparency due to nullifying of multipole moments', *43(3), 503-506, Opt. Letters*, (0(GS), 0(ISI) citations; IF 3.54; 16/159; Q1).

19) *Ang[S], A.S., **Karabchevsky[PI]**, **A.**, Minin[C], I.V., Minin[C], O.V., Sukhov[C], S.V., Shalin**[PI]**, A.S., 2018, "Photonic Hook' based optomechanical nanoparticle manipulator', Nature Sci. Rep, (0(GS), 0(ISI) citations; IF 4.63; 4/77; Q1).

20) *Katiyi[S], A. and **Karabchevsky[PI]**, **A.**, 2018 'Si Nanostrip Rib-Waveguide for On-Chip Broadband Molecular Overtone Spectroscopy in Near-Infrared', ACS Sensors, 3(3) 618-623 (1(GS), 0(ISI) citations; IF not achieved yet; Q1).

21) ***Karabchevsky[PI]**, **A.**, Katiyi[S], A., Abdul Khudus[C], M.I.M. and Kavokin[C], A.V., 2018, 'Tuning the near-infrared absorption of aromatic amines with photonic microfibers sculptured gold nanoparticles', ACS Photonics, DOI: 10.1021/acsphotonics.8b00025 (0(GS), 0(ISI) citations; IF 6.756; 21/642; Q1).

22) *Novitsky[C], A., Kovrov[C], A., **Karabchevsky[PI]**, **A.**, Shalin[PI], A.S., 2018, 'Photonic nanojet as a tunable and polarization sensitive optical tweezer', Annalen der Physik, DOI: https://doi.org/10.1002/andp.201800129 (0(GS), 0(ISI) citations; IF 3.039; 21/642; Q1).

23) *Novitsky[C], D., **Karabchevsky[PI]**, **A.**, Lavrinenko[C], A., Shalin[C], A.S., Novitsky**[PI]**, D., 2018, 'PT-symmetry breaking in multilayers with resonant loss and gain locks light propagation direction', Phys. Rev. B 98(12) (0(ISI) citations; IF 3.836; 133/1196 in physics; Q1).

24) *Ivinskaya[C], A., Kostina[C]. N., Proskurin[C], A., Petrov[C], M.I., Bogdanov[C], A.A., Sukhov[C], S., Krasavin[C], A.V., **Karabchevsky[PI]**, **A.**, Shalin[C], A.S., Ginzburg[PI], P., 2018, 'Optomechanical Manipulation with Hyperbolic Metasurfaces', ACS Photonics, DOI: 10.1021/acsphotonics.8b00775 (0(GS), 0(ISI) citations; IF 6.756; 21/642; Q1).

25) Terekhov[S], P.D., K.V., E., Babicheva[C], Baryshnikova[PD], V.E., Shalin[PI], A.S., **Karabchevsky[PI]**, **A.**, Evlyukhin[C], A.B., 2018, 'Multipole analysis of dielectric metasurfaces composed of nonspherical nanoparticles and lattice invisibility effect', Physical Review B, Phys. Rev. B, 96:035443, 1-7, (0(GS), 0(ISI) citations; IF 3.836; 133/1196 in physics; Q1).

• Lectures and Presentations at Meetings and Invited Seminars

(b) Presentation of papers at conferences/meetings (oral or poster)

1) Abdulhalim, **A. Karabchevsky**, C. Patzig, B. Rauschenbach, B. Fuhrmann,'Comparative study of enhanced fluorescence from nano sculptured thin films', SPIE Optics and Photonics, San Diego 2008, Proc. SPIE, Vol. 7041, 70410G (2008). *Oral*.
2) **Karabchevsky**, O. Krasnykov, M. Auslender, B. Hadad, A. Goldner, A., E. Eltzov, R. Marks, and I. Abdulhalim, Nano-scale metallic grating based structures for sensor applications', The 1st Mediterranean Conference on Nano-Photonics, (MediNano-1), Istanbul Turkey, 6-8 October 2008. *Poster*.
3) Abdulhalim, **A. Karabchevsky**, C. Patzig, B. Rauschenbach, B. Fuhrmann, E. Eltzov, R. Marks, J. Xu, F. Zhang, A. Lakhtakia, Towards the biosensing applications of sculptured thin films', The 1st Mediterranean Conference on Nano-Photonics, (MediNano-1), Istanbul Turkey, 6-8 October 2008. *Invited Oral*.
4) M. Auslender, **A. Karabchevsky**, O. Krasnykov, B. Hadad, A. Goldner, and Abdulhalim, 'Nano-scale metallic grating based structures for sensor applications', The 1st Mediterranean Conference on Nano-Photonics, (MediNano-1), Istanbul Turkey, 6-8 October 2008. *Invited Oral*.
5) **Karabchevsky**, I. Abdulhalim, C. Patzig, B. Rauschenbach, B. Fuhrmann, J. Xu, F. Zhang, A. Lakhtakia, 'Nanophotonic structures to control water quality', The 12th meeting on Optical Engineering and Science, Israel Tel Aviv, 23-24 March 2009. *Poster*.
6) **Karabchevsky**, C. Khare, C. Patzig, I. Abdulhalim, B. Rauschenbach, 'Metallic columnar nano-structured thin films for surface enhanced fluorescence and biosensing in water', FluoroFest09 Fluorescence Workshop, Prague Czech Republic, 3-6 May 2009. *Poster*.
7) **Karabchevsky**, C. Khare, C. Patzig, I. Abdulhalim, B. Rauschenbach,'Metallic columnar nano-structured thin films for surface enhanced fluorescence and biosensing in water', FluoroFest09 Fluorescence Workshop, Prague Czech Republic, 3-6 May 2009. *Oral*.
8) **Karabchevsky**, I. Abdulhalim, 'Enhanced Optical Transmission due to Double LSPR Excitation at Metal Grating Interfaces and its Advantage in Sensing', The 2nd Mediterranean Conference on Nano-Photonics, (MediNano-2), Athens Greece, 26-27 Oct 2009. *Oral*.
9) Shalabney, **A. Karabchevky**, C. Khare, C. Patzig, B. Rauschenbach, A. Lakhtakia, and I. Abdulhalim, 'Optimization of Sculptured Thin Films for Optical Signals Enhancement for Biosensing', The 2nd Mediterranean Conference on Nano-Photonics, (MediNano-2), Athens Greece, 26-27 Oct 2009. *Oral*.
10) **Karabchevsky**, S. Karabchevsky, I. Abdulhalim, 'Fast Surface Plasmon Resonance Imaging Sensor', The 3rd Mediterranean Conference on Nano-Photonics, (MediNano-3), Belgrade Serbia, 18-19 Oct 2010. *Oral*.
11) **Karabchevsky**, M. Auslender, I. Abdulhalim, 'Localized versus Extended Surface Plasmon Resonances excited in Nano-gratings with Nano-scale Thick-ness', NanoIsrael 2010, Tel-Aviv Israel, Nov 8-9 2010. *Poster*.
12) **Karabchevsky**, L. Tsapovsky, R. Marks, I. Abdulhalim, 'Endocrine Disruptor Nanolayer Detection using Surface Plasmon Resonance Imaging', NanoIsrael 2010, Tel-Aviv Israel, 8-9 Nov 2010. **This oral presentation was recognized with the First place in The 2nd International Nanotechnology Student Poster Award**. *Poster*.

13) **Karabchevsky**, L. Tsapovsky, R. Marks, I. Abdulhalim, 'Fast Surface Plasmon Resonance Imaging Sensor using Radon Transform and its Application in Biosensing', OASIS 2011, Tel-Aviv Israel 9-10 March 2010. *Poster*.
14) **Karabchevsky**, L. Tsapovsky, R. Marks, I. Abdulhalim, 'Metallic Nano-Sculptured Thin Films as Fluorescence Sensors for Biochemical Receptors Immobilized on Surfaces', OASIS 2011, Tel-Aviv Israel, 9-10 March 2011. *Poster*.
15) **Karabchevsky**, L. Tsapovsky, R. S. Marks, I. Abdulhalim, 'Optical immunosensor for endocrine disruptor nanolayer detection by surface plasmon resonance imaging', SPIE Optics and Photonics, San Diego USA, 2011. *Poster*.
16) **Karabchevsky**, C. Patzig, B. Rauschenbach, I. Abdulhalim, 'Microspot surface enhanced fluorescence from sculptured thin films for control of antibody immobilization', SPIE Optics and Photonics, San Diego 2011, USA. **This oral presentation was recognized with a Best SPIE Publishing Student Lecture Award**. *Oral*.
17) **Karabchevsky**, P. Hua, J. S. Wilkinson, 'Simple evanescent field sensor for NIR spectroscopy', 6th Mediterranean Conference on Nano-Photonics (MediNano6) Lyon France 30-31 Oct 2013. *Oral*.
18) Mosayyebi, **A. Karabchevsky**, J. S. Wilkinson, 'Nanoparticle-enhanced chemiluminescence in microflow injection analysis', 6th Mediterranean Conference on Nano-Photonics (MediNano-6) Lyon France 30-31 Oct 2013. *Poster*.
19) J. T. G. Butement, H. C. Hunt, D. J. Rowe, **A. Karabchevsky**, P. Hua, G. S.Murugan, O. Clark, C. Holmes, L. G. Carpenter, J. C. Gates, P. G. R. Smith,J. E. Chad, J. S. Wilkinson, 'A microflow cytometer for microsphere-based immunoassays using integrated optics and inertial particle focusing' Biosensors 14, Melbourne 27-30 May 2014. *Poster*.
20) **Karabchevsky**, M. N. Zervas, J. S. Wilkinson, 'Orthonormal complex hybrid guided mode coupling over a discontinuity in a plasmonic waveguide', XXII International Workshop on Optical Wave Waveguide Theory and Numerical Modelling (OWTNM 2014) Institute Fresnel, Nice 27-28 Jun 2014. *Oral*.
21) **Karabchevsky**, G. Buscemi, MIM. Abdul Khudus, P. G. Lagoudakis, M. N. Zervas and J. S. Wilkinson, 'Broadband near-infrared spectroscopy of organic molecules on compact photonic devices', 5th International Topical Meeting on Nanophotonics and Metamaterials (NANOMETA '15), Seefeld, Austria 5-8 Jan 2015. *Poster*.
22) **Karabchevsky**, 'Controlling absorption of light by molecules with integrated optics based systems', Impact on Energy, Environment, Health and Water, Ben-Gurion University of the Negev, Israel, 27 May - 1 Jun 2015. *Invited Oral*.
23) **Karabchevsky**, 'Disordered photonics: strong scattering and enhanced absorption in disordered molecular layers of primary amines', "Light in Science", International Conference, Ben-Gurion University of the Negev, Israel, 9 - 10 Jun 2015. *Oral*.
24) **Karabchevsky**, A. Mosayyebi, A. V. Kavokin, 'Glowing microfluidics', NanoIsrael Conference, Tel-Aviv University, Israel, 22 - 34 Feb 2016. *Poster*.
25) **Karabchevsky**[PI], 'Fano-resonance line shape of near-guided surface plasmon polariton coupling to molecular vibrational overtones', Mediterranean Institute of Fundamental Physics, Rome, Italy 22 - 26 Mar 2016. *Oral*.
26) **Karabchevsky**[PI], Y. Gorodetski[C], 'Plasmonic rac-and-pinion gear with chiral metasurfaces', SPIE Photonics Europe, Belgium, 3 - 7 Apr 2016. *Oral*.
27) **Karabchevsky**[PI], A. Shalabney[C], 'Strong interaction of molecular vibrational overtones with near-guided surface plasmon polariton', SPIE Photonics Europe, Belgium, 3 - 7 Apr 2016. *Oral*.
28) **Karabchevsky**[PI], A., Kavokin A. V., 'Enhanced molecular overtone absorption by light-on-a-chip', Meta16, Malaga Spain, 25-28 July 2016. *Oral.*

29) Katiyi, A., **Karabchevsky**[PI], A., 'Nano-tapers: squeezing light in a dielectric nano-guide for overtone spectroscopy', MetaNano, Anapa, Russia 5 - 9 Sep 2016. *Invited Talk.* (oral)
30) **Karabchevsky**[PI], A., 'Nanophotonics on a Chip: From Fundamentals to Emerging Applications', IVS 34th Annual Conference, Beer-Sheva, Israel 19 Sep 2016. *Invited Talk.* (oral)
31) **Karabchevsky**[PI], A., 'Glowing microfluidics without external light source', 34th Israeli Conference of Mechanical Engineering, Haifa, Israel 22-23 Nov 2016. *Invited Talk.* (oral)
32) Katiyi, A., Hadad, B., **Karabchevsky**[PI], A., 'Silicon Waveguides for Broadband overtone spectroscopy of N-Methylamine and Aniline in near-infrared, OASIS6, Tel Aviv, Israel 27-28 Feb 2017. (poster)
33) Galutin, Y., **Karabchevsky**[PI], A., 'Study of evanescent fields distortion perturbed by nanoparticle with metasurfaces on ridge waveguides', OASIS6, Tel Aviv, Israel 27-28 Feb 2017. (poster)
34) **Karabchevsky**[PI], A., 'Overtone spectroscopy with reconfigurable microfibers', OASIS6, Tel Aviv, Israel 27-28 Feb 2017. (oral)
35) **Karabchevsky**[PI], A., 'Near-infrared spectroscopy of aromatic amines on reconfigurable microfibers: unexpected enhancement of overtone absorption', Progress In Electromagnetics Research Symposium (PIERS), St Petersburg, Russia 22-25 May 2017. *Invited* (oral)
36) Terekhov, P. D., Baryshnikova, K.V., Shalin, A. S., **Karabchevsky**[PI], A. and Evlyukhin, A. B., 'Toroidal dipole associated resonant forward scattering of light by silicon nanoparticles', Progress In Electromagnetics Research Symposium (PIERS), St Petersburg, Russia 22-25 May 2017 (oral)
37) Galutin, Y., Falek, E., **Karabchevsky**[PI], A., 'Invisibility cloak scheme with composite plasmonic waveguides and metsurface overlayers', Progress In Electromagnetics Research Symposium (PIERS), St Petersburg, Russia 22-25 May 2017. (oral)
38) Terekhov, P.D., Baryshnikova, K.V., Artemyev, Y.A., Shalin, A.S., **Karabchevsky**[PI], **A**., Evlyukhin, A.B. 'Multipole optical response of silicon nanoparticles of different shape', Days on Diffraction 2017, St Petersburg, Russia ,19–23 June 2017 (oral).
39) Artemyev, Y.A., Shalin, A.S., Karabchevsky, A., 'Random all-dielectric anti-reflective metasurfaces on the waveguide facet ', SPIE OPTO 2018, San Francisco, California United States, 27 January - 1 February 2018. (oral).
40) Terekhov, P.D., Baryshnikova, K.V., Evlyukhin, A.B., Shalin, A.S., Karabchevsky, A.,'Excitation of high-order multipoles in Si metasurface', SPIE OPTO 2018, San Francisco, California United States, 27 January - 1 February 2018. (oral).
41) Terekhov, P.D., Baryshnikova, K.V., Artemyev, Y.A., Shalin, A.S., Karabchevsky, A., Evlyukhin, A.B., 'Optical multipole resonances of non-spherical silicon nanoparticles and the influence of illumination direction', SPIE OPTO 2018, San Francisco, California United States, 27 January - 1 February 2018. (oral).
42) Artemyev, Y.A., Shalin, A.S., Karabchevsky, A., 'Multipole excitations in all-dielectric metamolecules and in organic molecules', SPIE OPTO 2018, San Francisco, California United States, 27 January - 1 February 2018. (oral).
43) Galutin, Y., Karabchevsky, A., 'Optical Response of Waveguide with Spatially Varying Anisotrpoic Scatterers'. When Light Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. Poster.
44) Samyshkin, V., Galutin, Y., Kutrovskaya, S., Kucherik, A., **Karabchevsky**, **A.**, 'Carbyne Based Metasurfaces Stabilized with Metallic Nanoparticles'. When Light

Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. (Poster).

45) Vlolsky, N., Basharin, A. A., **Karabchevsky**, **A.**, 'Toroidal dipole excitation in nanoantennas embedded in different media', When Light Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. (Poster).
46) Dadadzhanov, DR, Vartanyan, T.A, **Karabchevsky**, **A.**, 'Quality factor of plasmonic nanoparticles for efficient emission of chemiluminescence', When Light Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. Poster.
47) Ang A.S., Minin I.V., Minin, V.M., Sukhov S.V., Shalin, A. S., **Karabchevsky**, **A.**, 'Photonic Hook as Nanoparticle Manipulator', When Light Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. Poster.
48) Katiyi, A., Galutin, Y., Hadad, B., **Karabchevsky, A.**, 'Deflected Talbot effect on nanostrip waveguides with inclusions' When Light Meets Matter, Weizmann Institute of Science, Rehovot, Israel, January 14-15, 2018. (Poster).
49) **Karabchevsky**, **A.**, Artemyev, Y.A., Volsky, N., Basharin, A.A, Shalin A.S., 'Shaping Light with an Inclusion: Contribution of Multipoles in Scattering Effect on Waveguide'. META Conference, Round-Trip Marsielle Cruise, 2018. (Invited)
50) Samyshkin, V., Galutin, Y., Kutrovskaya, S., Kucherik, A., **Karabchevsky**, **A.**, 'Carbyne Based Metasurfaces Stabilized with Metallic Nanoparticles'. META Conference, Round-Trip Marsielle Cruise, 2018. (oral)
51) **Karabchevsky**, **A.**, Galutin, Y., 'Anti-Reflective All-Dielectric Metasurfaces Engraved on an Optical Waveguide Facet'. META Conference, Round-Trip Marsielle Cruise, 2018. (oral)
52) Ang A.S., Minin I.V., Minin, V.M., Sukhov S.V., Shalin, A. S., **Karabchevsky**, **A.**, 'Low-contrast photonic hook manipulator for cellular differentiation'. META Conference, Round-Trip Marsielle Cruise, 2018. (Invited)
53) Katiyi, A, **Karabchevsky**, **A**., 'Si Nanostrip Optical Waveguide for Molecular Overtone Spectroscopy'. META Conference, Round-Trip Marsielle Cruise, 2018. (Invited)
54) Dadadzhanov D.R., Vartanyan T.A., **A. Karabchevsky A.**, 'Light creation without pump: tuning plasmonic resonance for surface-enhanced chemiluminescence'. SPIE Optics and Photonics, NANOOP18, 2018, *(poster)*
55) Dadadzhanov D.R., Vartanyan T.A., A. **Karabchevsky A.**, 'Vibrational overtones spectroscopy enabled by plasmonic nanoantennas'. SPIE Optics and Photonics, San Diego, California United States, 19 August 2018 to 23 August 2018, (poster)
56) Dadadzhanov D.R., Vartanyan T.A., **Karabchevsky A.**, 'Luminol Chemiluminescence Enhancement in the Presence of Colloidal Plasmonic Nanoparticles'. PCNSPA 2018 - Photonic Colloidal Nanostructures: Synthesis, Properties, and Applications Saint Petersburg, June 4-8, 2018 (*poster)*
57) **Karabchevsky**, **A**., 'Overtone spectroscopy on a chip: Overview of fundamentals and important applications', SPIE Photonics West 2019, (*Invited Talk)*
58) Terekhov, P.D., Baryshnikova, K.V., Babicheva, V. E., Shalin, A.S., **Karabchevsky**, **A.**, Evlyukhin, A.B. 'Transmission and reflection features of all-dielectrics metasurfaces with electric and magnetic resonances', SPIE Photonics West 2019, *Submitted*
59) Terekhov, P.D., Evlyukhin, A.B., Shalin, A.S., **Karabchevsky, A.**, 'High-refractive-index nanoparticles embedded in media: Multipole evolution and broadband forward scattering enhancement', SPIE Photonics West 2019, *Submitted*

(d) Seminar presentations at universities and institutions

1. **A. Karabchevsky**, 'Waveguiding molecular signatures on waveguides', Hall University UK, 26 Nov 2014. *Invited*
2. **A. Karabchevsky**, 'Evanescent Spectroscopy - Theory and Experiment', Zepler Institute Southampton University UK, 7 Jul 2014. *Invited*
3. **A. Karabchevsky**, 'Towards Surface Enhanced IR Absorption (SEIRA) Spectroscopy on Waveguides', Nanophotonics and Metamaterials (NanoMeta) Seminar, Southampton University UK, 26 Jan 2015. *Guest speaker*
4. **A. Karabchevsky**, 'Molecules, Glass and Light', Electric and Computer Engineering, Technion IL, 5 May 2015. *Guest speaker*
5. **A. Karabchevsky**, 'Molecules, Glass and Light', Electrootpical Engineering, BIU IL, 13 July 2015. *Guest speaker*
6. **A. Karabchevsky**, 'Molecules, Glass and Light', Weizmann Institute of Science IL, 17 September 2015. *Guest speaker*
7. **A. Karabchevsky**, 'Integrated Photonic Devices', Applied Physics seminar, Hebrew University of Jerusalem IL, 21 October 2015. *Guest speaker*
8. **A. Karabchevsky**, 'Tuning the chemiluminescence of a luminol flow using integrated nanophotonic system', Biomedical Engineering, BGU IL, 18 May 2016. *Guest speaker*
9. **A. Karabchevsky**, 'Integrated Photonics for Molecular Science and Emerging Applications', The School of Chemistry, TAU IL, 10 November 2016. *Guest speaker*
10. **A. Karabchevsky**, 'Molecules, Glass and Light', Biotechnology Engineering, BGU, 12 Nov 2017. *Guest speaker*
11. **A. Karabchevsky**, 'Light-on-Chip', School of Electrical Engineering, Tel-Aviv University, TAU IL, 24 May 2018. *Guest speaker*
12. **A. Karabchevsky**, 'Light is fun: hooray let's play!', Outreach lecture for pupils, Lehavim school IL, 27 July 2018. *Guest speaker*
13. **A. Karabchevsky**, 'Manipulate with Light? So, hay, why pay!', SCD company, IL, 1 August 2018. *Guest speaker*

• **Patents**

2016, **A. Karabchevsky**, 'Glowing microfluidic chip: Tuning the chemiluminescence of a luminol flow using plasmonic nano-antennas'. Invention number 62/353,578. A PCT application was filed on 25.6.17

2016, **A. Karabchevsky**, 'Broadband spectrometer based on the tapered fiber device'. Invention number 62/353,578. A PCT application was filed on 25.6.17

2017, **A. Karabchevsky**, Invisibility Cloaking Scheme by Evanescent Fields Distortion on Composite Plasmonic Waveguides with Si Nano-Spacer. Invention number 62/560,223. A provisional application was filed on 19.9.17

2018 **A. Karabchevsky** and B. Zabezhinsky, 'Guided wave device for light manipulation on fibers', *Provisional*

2018 **A. Karabchevsky** and B. Zabezhinsky, 'Glass Melting Vessel for Manufacturing of Optical Fiber', *Provisional*

2018 **A. Karabchevsky**, 'Fabrication of thin and stiff carbon wires by electric field applied on linear carbon chains', *Provisional*

2018 A. Karabchevsky, I. Gurwich, Y. Galutin, 'Broadband anti-reflective metasurfaces with random height on waveguide facets' *Provisional*.

• **Research Grants**:

2016-2018, MAFAT, **A. Karabchevsky**[PI], **'**Cloaking on a chip', 30k$, 60k$.

2017-2018, Ben-Gurion University, **A. Karabchevsky**[PI], 'Broadband spectroscopy', 115k$.

2017-2018, Ben-Gurion University, **A. Karabchevsky**[PI] and M. Elkabetz[PI] **'**Integration of nano-photonic devices to study the efficiency of cancer treatment', 30k$.
2017-2019, KAMIN, **A. Karabchevsky**[PI], 'Random antireflective metasurfaces', 252k$.

• **Present Academic Activities**

Books and articles to be published

1. Y. A. Artemyev[S], I. Gurwich[C], V. Savinov[C], A.S. Sahlin[C] and***A. Karabchevsky**[PI] et. all, 'Near-infrared spectroscopy of aromatic amines adsorbed on nanoparticles on reconfigurable microfibers: unexpected enhancement of absorption', *Under Review by Phys Rev X*.
2. Shamkhi, .H.K., Baryshnikova, K.V., Sayanskiy, A., Kapitanova, P., Terekhov, P.D., **Karabchevsky**, **A.**, Evlyukhin, A.B., Belov, P., Kivshar, Y., Shalin, A.S., 2018, 'Transverse scattering with the generalised Kerker effect in high-index nanoparticles', *Under Review by Phys Rev Letters*
3. **Karabchevsky**, **A.**, Karabchevsky S., 'Lorenz force aligns monoatomic carbon chains into carbyne on a chip' *In preparation for Science*

• **Additional information**

I conducted my Ph.D. in the field of plasmonics, undertaking both experimental and theoretical research. While I have been and still am fascinated with this field, I decided to focus my post-doctoral training (and my current research) in the field which allows for development of 'technology of the future' which is integrated photonics (resulting in publications, e.g. in Nature Light: Science & Applications, Nature *Scientific Reports and Optics Express*). I inscribed waveguides which are channels for the light to flow, on a piece of polished glass with molecules attracted to the miniature circuit once charged with oxygen (published in *Scientific Reports*). My optical chips have many broad applications and many new directions this work encourages to explore – from fundamental breakthroughs in molecular harmonics excitation under evanescent radiation on a chip and doctor-in-your-pocket devices (published in *Scientific Reports*). I have contributed to the fundamental theory understanding of the propagation of electromagnetic waves in composite-plasmonic waveguide structures. My semi-analytical model enables design and prediction of functioning of integrated optical components including polarisers, sensors, surface-enhanced Raman spectrometers, telecommunication filters and all-optical switches (published in *Optics Express*). The Purcell enhanced chemiluminescence in my integrated microfluidic channel opens a way for improving detection limits of chemiluminescence for forensic science, biology and chemistry research (*Light: Science & Applications*). Harnessing my multidisciplinary background, I integrate chemistry with photonics, plasmonics with quantum science. *Synergy between different disciplines allows me: 1) to understand fundamental phenomena, naturally covered under the carpet of ambiguity, and 2) to create novel devices for emerging applications based on these insights.* Outcomes of my work are fundamental and broadly applicable. I believe that the new research areas underpinned by advanced technological opportunities pave the rode for new possibilities and directions for emerging applications, including quantum information processing on a chip, all-optical processing on a chip, doctor-in-your-pocket devices, security and sensing.

• Synopsis of research, including reference to publications and grants in above lists

Broad Impact of Planar Photonic Devices

"Let there be Light (Photonics!)", Genesis 1:3. From the very first studies of optics 1000 year ago, through the invention of the laser about five decades ago to optics communications which powers the internet today, photonics has revolutionized medicine, opened up international communication via Internet, and continues to be central to linking cultural, economic and political aspects of the global society. The ability to manipulate and tailor electromagnetic signals on a guided-wave devices (**Karabchevsky** and Kavokin**,** *Scientific Reports* 2016), emerging from recent technological advances, facilitates addressing fundamental (Terekhov,..,**Karabchevsky** and Evlyukhin PRB 2017, Terekhov,..,**Karabchevsky** and Evlyukhin, Opt. Let. 2017) and technological challenges (**Karabchevsky,** *Light Science and Applications* 2016, Katiyi and **Karabchevsky** Journal of Lightwave Technology 2017), and paves the way for a variety of new applications such as cloaking on a chip (Galutin, Felek and **Karabchevsky** SciRep Accepted 2017; MAFAT grant 2016-2018), monitoring of the cancer treatment efficiency (ENG-MED grant 2017-2018). Integrated photonics is expected to play an increasingly important role in optical communications, imaging, sensing with the promise for significant reduction in the cost and weight of these systems. Future advancement of this technology is critically dependent on an ability to develop compact and reliable optical components and facilitate their integration on a common substrate. Novel devices of engineered photonics (**Karabchevsky,** *Light Science and Applications* 2016) will find use in various applications, such as homeland security, cyber, biotech, optics communication, space and quantum technology to name a few. As tools for biology and medicine, multifunctional optical traps will facilitate new approaches to cell sorting, macromolecular purification, intracellular surgery, embryonic testing and highly parallel drug screening. According to the Photonics Industry Report 2013, the photonics market is expected to reach US$ 890 billion in 2020 and has been growing twice as fast as the global GDP. Israel is among the world leading nations in photonics and nanotechnology research. Driven by the dream of untapped planar device functionality, my research merges the fundamentals of chemistry, physics and engineering. All this will aimed at studying the interaction of light with matter on a waveguide in diffraction limit regime, at the scale where optical, electronic, structural, thermal and mechanical properties are deeply interdependent. The aim of my research is to control light fast (BGU-ITMO^3 University joint project), within only a few oscillation cycles of the light wave, in a miniature device containing only a few layers of atoms (BGU- Vladimir State University^3 joint project) using signals carried by only a few photons.