

Sergey G. Menabde

Ph.D.

Post-Doctoral Researcher

Dept. of Electrical Engineering, KAIST

Contact information

Phone +82-10-5441-1984

E-mail menabde@kaist.ac.kr

Mailing address 2232 E3-2, KAIST, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, Korea

Research interests & ongoing work

Current research projects:

1. (as PI) Electrically tunable plasmonic crystal based on 2D materials.
2. Photonic sail design for laser-propelled interstellar spacecraft.

Research activity over the recent years: graphene photonics and plasmonics, physics of hot carriers in graphene/graphite and its application for photodetection, photodoping of graphene.

Other research experience: photonic crystal optimization, numerical methods for photonics, plasmonic waveguides, lens systems design and optimization.

Education

- ❖ Ph.D. (2012-2017), Seoul National University, major in Electrical Engineering, with an emphasis in photonics (GPA 3.9/4.3).
Thesis title: "One-dimensional transverse magnetic and unique transverse electric modes in graphene."
- ❖ M.Sc. (2007-2009), Seoul National University, major in Electrical Engineering (GPA 3.7/4.3).
Thesis title: "Photonic crystal waveguide optimization for directional emission effect."
- ❖ M.Sc. (2005-2007), B.Sc. (2001-2005), Bauman Moscow State Technical University, major in Optoelectronics and Optical Engineering (GPA 4.9/5.0 Diploma Cum Laude).
Thesis title: "Initial schemes design for a compact zoom lens with large zoom ratio."

Work experience

- ❖ 09.2009-07.2012 (2 years 10 months): R&D Engineer, Samsung Electronics (Suwon, Korea).
Job responsibility: novel optical systems design.
Projects: compact 3D camera, endoscope lens with autofocus, retina recognition system for mobile security.

Awards & scholarships

- "Excellent Graduate Student Award" of the year 2016, Seoul National University.
- "Journal of Materials Chemistry C Poster Prize" at Metamaterials Congress 2015, Univ. of Oxford, UK.
- Samsung Global Scholarship (GSP-SNU) recipient: full support (tuition and living) for 2007-2009 M.Sc. course at Seoul National University.

Additional skills & experience

Knowledge of languages: English (fluent), Korean (advanced), Russian (native).

Programming experience: automated optimization of photonic crystals using own FDTD code.

2005-2007 (2 years): student researcher at Samsung Optical Design Center (Moscow, Russia).

Publications list appended below.

References available upon request.

- List of publications -

† equal contribution; ‡ corresponding author

Published papers

1. Seyoon Kim,† **Sergey Menabde**,† Victor W. Brar,‡ and Min Seok Jang,‡ “Functional Mid-Infrared Polaritonics in van der Waals Crystals,” *Adv. Opt. Mater.* **XX**, XXX (2019).
2. Juho Park, Sanmun Kim, Joongwon Lee, **Sergey Menabde**,‡ Min Seok Jang,‡ “Ultimate light trapping in free-form plasmonic waveguide,” *Phys. Rev. Appl.* **12**, 024030 (2019).
3. Joel Siegel, Anthony Wang, **Sergey Menabde**, Mikhail A. Kats, Min Seok Jang, Victor W. Brar,‡ “Self-Stabilizing Laser Sails Based on Optical Metasurfaces,” *ACS Photonics* **6**, 2032-2040 (2019).
4. Sanghoon Kim,† **Sergey Menabde**,† and Min Seok Jang,‡ “Efficient Photodoping of Graphene in Perovskite–Graphene Heterostructure,” *Adv. Electron. Mater.* **5**, 1800940 (2019).
5. Min Seok Jang,‡ Seyoon Kim, Victor W. Brar, **Sergey Menabde**, and Harry A. Atwater, “Modulated Resonant Transmission of Graphene Plasmons Across a $\lambda/50$ Plasmonic Waveguide Gap,” *Phys. Rev. Appl.* **10**, 054053 (2018).
6. **Sergey Menabde**, Hyunwoo Cho, and Namkyoo Park,‡ “Interface defect-assisted phonon scattering of hot carriers in graphene,” *Phys. Rev. B* **96**, 075426 (2017).
7. Viacheslav Shaidiuk, and **Sergey Menabde**,‡ “Modal evolution in asymmetric three- and four-layer plasmonic waveguides,” *Optics Express* **24**, pp. 16595-16608 (2016).
8. Viacheslav Shaidiuk,† **Sergey Menabde**,† and Namkyoo Park,‡ “Effect of structural asymmetry on three layer plasmonic waveguide properties,” *J. Opt. Soc. Am. B* **33**, pp. 963-970 (2016).
9. **Sergey Menabde**, Daniel R. Mason, Evgeny Kornev, Changhee Lee, and Namkyoo Park,‡ “Direct Optical Probing of Transverse Electric Mode in Graphene,” *Scientific Reports* **6**, 21523 (2016).
10. Daniel R. Mason,† **Sergey Menabde**,† Sunkyu Yu, and Namkyoo Park,‡ “Plasmonic Excitations of 1D Metal-Dielectric Interfaces in 2D Systems: 1D Surface Plasmon Polaritons,” *Scientific Reports* **4**, 4536 (2014).
11. Daniel R. Mason,† **Sergey Menabde**,† and Namkyoo Park,‡ “Unusual Otto excitation dynamics and enhanced coupling of light to TE plasmons in graphene,” *Optics Express* **22**, pp. 847-858 (2014).
12. M. Sathish Kumar, **Sergey Menabde**, Sunkyu Yu, and Namkyoo Park,‡ “Directional emission from photonic crystal waveguide terminations using particle swarm optimization,” *J. Opt. Soc. Am. B* **27**, pp. 343-349 (2010).

Patents

1. Korean Patent Application 10-2019-0016131 / Date: 2019.02.12 / Title: “NANO-FILTER FOR TUNABLE TRANSMISSION OF INFRARED RADIATION AND MANUFACTURING METHOD THEREOF” / Inventors: **Menabde, Sergey**; Jang, Min Seok / Assignee: KAIST.
2. Korean Patent Application 10-2019-0016132 / Date: 2019.02.12 / Title: “GRAPHITE-BASED PHOTODETECTOR AND MANUFACTURING METHOD THEREOF” / Inventors: **Menabde, Sergey**; Jang, Min Seok / Assignee: KAIST.
3. US 9706902 B2 / EP2596740 B1 / CN103135211 B / Title: “Objective lens for endoscopic device, actuator for focusing, and endoscopic system” / US Patent date: Jul. 18, 2017 / Inventors: **Sergey Menabde** [primary], Jongchul Choi, Haein Chung / Assignee: Samsung Electronics.

International conference proceedings

1. Juho Park, Sanmun Kim, Sangjun Han, Heonhak Ha, **Sergey Menabde**,[‡] Min Seok Jang,[‡] “Ultimate light trapping in free-form plasmonic waveguide,” The 9th International Conference on Surface Polariton Photonics (SPP9), Copenhagen, Denmark, May 2019.
2. **Sergey Menabde**, Shinho Kim, Heonhak Ha, Min Seok Jang,[‡] “Ultra-compact optical switch based on Fano resonance in graphene-functionalized plasmonic nano-cavity,” SPIE Nanoscience + Engineering 2018, San Diego, California, United States, August 2018.
3. **Sergey Menabde**, Ju Yeong Kim, Sung Yoon Min, Min Seok Jang,[‡] “Role of interface defect in hot carriers extraction at graphene-metal contact,” SPIE Nanoscience + Engineering 2018, San Diego, California, United States, August 2018.
4. Sang Hoon Kim, **Sergey Menabde**, and Min Seok Jang,[‡] “Photo-doping of Graphene Enhanced by Stable Perovskite and Hole Transfer Layer,” The 19th International Symposium on the Physics of Semiconductors and Applications (ISPSA 2018), Jeju, Korea, July 2018.
5. Xianji Piao, Sunkyu Yu, **Sergey Menabde**, and Namkyoo Park,[‡] “Anisotropic Metamaterials for Controlling Transverse Spin of Light,” The 8th International Conference on Surface Plasmon Photonics (SPP8), Taipei, Taiwan, May 2017.
6. **Sergey Menabde**, Daniel R. Mason, Evgeny Korney, Changhee Lee and Namkyoo Park,[‡] “Detection of exotic transverse electric mode in graphene,” Near Field Optics 14 (NFO’14), Hamamatsu, Japan, September 2016.
7. **Sergey Menabde**, Viacheslav Shaidiuk, and Namkyoo Park,[‡] “Asymmetric plasmonic waveguides as platform for coupling between surface plasmons and propagating waves,” Near Field Optics 14 (NFO’14), Hamamatsu, Japan, September 2016.
8. **Sergey Menabde**,[‡] and Namkyoo Park, “Detection of Transverse Plasmons in Multilayer Graphene,” Metamaterial’2015 Congress, University of Oxford, UK, September 2015 (*award winner*. Journal of Materials Chemistry C Poster Prize).
9. **Sergey Menabde**, Daniel Mason, and Namkyoo Park,[‡] “Enhanced coupling of light to TE plasmons in multilayer graphene,” Near Field Optics 13 (NFO’13), Salt Lake City, USA, September 2014.
10. Daniel Mason,[‡] **Sergey Menabde**, Sunkyu Yu, Seungkyun Park, and Namkyoo Park, “1D plasmons at metal-dielectric interfaces in 2D systems,” Near Field Optics 13 (NFO’13), Salt Lake City, USA, September 2014.
11. **[Invited talk]** Daniel Mason, **Sergey Menabde**, Sunkyu Yu, and Namkyoo Park,[‡] “1-Dimensional Surface Plasmon Polaritons in 2-Dimensional Systems,” 3rd Korea-Japan Metamaterials Forum 2013, K1, Seoul, June 2013.
12. **Sergey Menabde**, Daniel R. Mason, and Namkyoo Park,[‡] “Non-Abrupt-Edge Effects on Graphene Edge Plasmon Dispersion,” Conference on Surface Plasmon-Polaritons (SPP6), Ottawa, Canada, 25-31 May 2013.
13. **Sergey Menabde**,[‡] “Small-size Zoom Lens Design,” Optics-Photonics Design & Fabrication ODF’06, Nara, Japan, December 2006.
14. **Sergey Menabde**,[‡] “Automated zoom lens design,” Frontiers in Optics 2006, Rochester, USA, October 2006.
15. **Sergey Menabde**,[‡] and Vitaly Klimov, “Automated zoom lens design and second-order derivative optimization methods,” Optics & Photonics 2006, San-Diego, USA, August 2006.

Domestic (Korean) conferences

1. **[Invited talk] Sergey Menabde**, Sanghoon Kim, Min Seok Jang, “Graphene photodoping platform for active and gate-less photonic devices,” The 26th Conference on Optoelectronics and Optical Communications (COOC 2019), Busan, Korea, June 2019.
2. **[Plenary talk] Sergey Menabde**, Sunkyoo Yu, Xianji Piao, Daniel R. Mason, and Namkyoo Park,‡ “Low Dimensional Nano-Photonic Systems,” OSK Annual Summer Meeting 2014, Cheju, Korea, August 2014.

Other publications

1. **Sergey Menabde**,‡ “Automated small-size zoom-lenses synthesis method,” The 1st scientific and practical conference “Young Opticians Meeting” (“YOM – 2005”), BMSTU, Moscow, 2005.
2. **Sergey Menabde**,‡ “Automated synthesis method for digital camera’s small-size zoom-lenses,” Student Scientific Bulletin: Collected Articles of University Conference “Student scientific spring – 2005,” BMSTU, Moscow, 2005, ISBN 5-98669-003-6.
3. Vitaliy Klimov, and **Sergey Menabde**,‡ “Surface shape synthesis method for single-lens objective with using partial derivatives,” Student Scientific Bulletin: Collected Articles of University Conference “Student scientific spring – 2005”, BMSTU, Moscow, 2005, ISBN 5-98669-003-6.