



Dr. Alexey Kolomiytsev

Head of Department
Department of Nanotechnologies and
Microsystems Technology

Southern Federal University,
Rostov-on-Don - Taganrog

Tel.:+79185717854

e-mail: askolomiytsev@sfnedu.ru

My research interests are in the field of nanotechnology for microelectronics, the creation and development of new materials for sensors and MEMS. In recent years, I have been actively studying the focused ion beam (FIB) local patterning of solids for different applications. Throughout my research I developed expertise in the area of surface physics as I investigated the dynamics of the processes on-going in the surface layers, by using scanning probe microscopy techniques (AFM, STM, UHV SPM) as well as scanning electron microscopy (SEM) and scanning ion microscopy. In addition to the experimental work I developed analytical modelling in MathCad and a little bit in Matlab. The core of my work regards focused ion beam method. I am an advanced certified user of different FIB systems (FEI Company, Orsay Physics). I also have experience with X-ray microanalysis systems (EDAX Genesis), electron beam lithography (Raith Elphy), scanning probe microscopes (NT-MDT).

Degrees

Ph.D., Solid-state electronics, components of radioelectronics, micro- and nanoelectronics, devices based on quantum effects, Southern Federal University, Russia, 2011

Master of Science, Electronics and microelectronics, Southern Federal University, Russia, 2008

Bachelor of Science, Electronics and microelectronics, Taganrog State University of Radio Engineering, Russia, 2006

Current Academic Position

Head of department, Department of Nanotechnologies and Microsystems Technology, Institute of nanotechnologies, Electronics and Equipment Engineering, Southern Federal University (since 2017)

Deputy Director for Internationalization and Cooperation, Department of Nanotechnologies and Microsystems Technology, Institute of nanotechnologies, Electronics and Equipment Engineering, Southern Federal University (since 2018)

Director of Master Programme in Nanotechnologies (since 2018)

Employment History

2008-2011: Process engineer, Research and Educational Center "Nanotechnologies", Southern Federal University, Russia

2011-2014: Assistant, Department of Nanotechnologies and Microsystems Technology, Institute of nanotechnologies, Electronics and Equipment Engineering, Southern Federal University, Russia

2014-2017: Associate Professor, Department of Nanotechnologies and Microsystems Technology, Institute of nanotechnologies, Electronics and Equipment Engineering, Southern Federal University, Russia

Professional Affiliations

European Focused Ion Beam users group member

Scientific Interests:

Technology of nanomaterials and nanodevices. Focused ion beam technology. Microelectronics. Interaction of ions with solids. FIB-induced deposition. Electron beam lithography. Scanning electron microscopy. Nanoprototyping and nanolithography. Synthesis and application of graphene. Have some experience in the area of MEMS and NEMS technology.

Languages:

English – C1, Russian – native.

Courses

Master Programme

- Electron- and Ion-beam technologies (lectures and practical classes, delivered in Russian and English)

- Vacuum microelectronics (lectures, delivered in Russian)

Bachelor Programme

- Methods for diagnostics and analysis of micro-and nanosystems (lectures and practical classes, delivered in Russian and English)

- Reliability of electronic devices (lectures and practical classes, delivered in Russian and English)

- Technology of materials (lectures and practical classes, delivered in Russian and English)

Honours and Awards

- Silver medal at the International Exhibition of Inventions in Geneva, 2012 (Geneva, Switzerland)
- Diploma of the 3rd International Competition of Young Scientists in the field of nanotechnology (Rusnanotech), 2010 (Moscow, Russia)
- Diploma of the 2nd International Competition of Young Scientists in the field of nanotechnology (Rusnanotech), 2009 (Moscow, Russia)
- Diploma of the All-Russian competition of graduation projects, dissertations and master's theses in the field of materials "Materials - 2007", (Russia)
- Diploma for 1st place of the All-Russian competition of graduation projects, dissertations and master's theses in the field of materials "Materials - 2008", (Russia)
- Diploma for 3rd place of the 6th Russian intellectual forum "Nanotechnology - a breakthrough in the future" (supervisor), 2012, (Lomonosov Moscow State University, Moscow)

Scholarships and grants

- Scholarship of the President of the Russian Federation, 2010 – 2011.
- Russian Scientific Fund 2018-2020 “Research local ion-induced deposition of materials for the formation of probes for nanodiagnostics”
- Russian President grant for state support of young scientists - PhD in the field of technical sciences and engineering, 2016.
- Russian President grant for state support of young scientists - PhD in the field of technical sciences and engineering, 2019.

Publications:

105 publications: 58 scientific papers and 7 training manuals.

Below are the main scientific articles (indexed in Scopus and ISI):

- O. A. Ageev, A. M. Alexeev, A. V. Vnukova, A. L. Gromov, A. C. Kolomiytsev, and B. G. Konoplev Modeling of the Substrate Topography upon Nanosized Profiling by Focused Ion Beams. *Nanotechnologies in Russia*, 2014, Vol. 9, Nos. 1–2, pp. 31–37.
- O. A. Ageev, Yu. F. Blinov, O. I. Il'in, A. S. Kolomiitsev, B. G. Konoplev, M. V. Rubashkina, V. A. Smirnov, A. A. Fedotov Memristor Effect on Bundles of Vertically Aligned Carbon Nanotubes Tested by Scanning Tunnel Microscopy. *Technical Physics*, 2013, Vol. 58, No. 12, pp. 1831–1836.
- O. A. Ageev, O. I. Il'in, A. S. Kolomiytsev, B. G. Konoplev, M. V. Rubashkina, V. A. Smirnov, and A. A. Fedotov, V.A. Smirnov, Development of a technique for determining young's modulus of vertically aligned carbon nanotubes using the nanoindentation method // *Nanotechnologies in Russia*, 2012, Vol. 7, Nos. 1–2, pp. 47–53.
- M.V. Il'ina, O.I. Il'in, Yu.F. Blinov, V.A. Smirnov, A.S. Kolomiytsev, A.A. Fedotov, B.G. Konoplev, O.A. Ageev Memristive switching mechanism of vertically aligned carbon nanotubes // *Carbon*, Volume 123, pp. 514-524 2017 (<http://www.sciencedirect.com/science/article/pii/S000862231730773X>)
- O. A. Ageev, A. M. Alekseev, A. V. Vnukova, A. L. Gromov, A. S. Kolomiytsev, B. G. Konoplev, S. A. Lisitsyn Studying the Resolving Power of Nanosized Profiling Using Focused Ion Beams // *Nanotechnologies in Russia*, 2014, Vol. 9, Nos. 1–2, pp. 26–30.
- O.A. Ageev, E.Yu. Gusev, J.Yu. Jityaeva, A.S. Kolomiytsev, Al.V. Bykov Fabrication of polycrystalline silicon elements for micro and nanomechanical accelerometers // *Advanced Materials, Mechanical and structural Engineering*. - London: Taylor&Francis Group, 2016. pp. 12- 17 (ISBN: 978-1-138-02908-8).
- O.A. Ageev, A.S. Kolomiytsev, A.V. Bykov, V.A. Smirnov, I.N. Kots Fabrication of advanced probes for atomic force microscopy using focused ion beam // *Microelectronics Reliability*, 55, 2015, p. 2131–2134.
- R. V. Konakova, O. B. Okhrimenko, A. M. Svetlichnyi, O. A. Ageev, E. Yu. Volkov, A. S. Kolomiytsev, I. L. Jityaev, O. B. Spiridonov Characterization of Field Emission Cathodes Based on Graphene Films on SiC // *Semiconductors*, 2015, Vol. 49, No. 9, pp. 1242–1245.
- Konakova, R.V., Okhrimenko, O.B., Kolomys, A.F., Strel'chuk, V.V., Svetlichnyi, A.M., Ageev, O.A., Volkov, E.Y., Kolomiitsev, A.S., Zhityaev, I.L., Spiridonov, O.B. Field emission properties of pointed cathodes based on graphene films on SiC // *Journal of Superhard Materials*, Volume 38, Issue 4, 2016, p. 235-240.
- Ageev, O.A., Balakirev, S.V., Bykov, A.V., Gusev, E.Y., Fedotov, A.A., Jityaeva, J.Y., Il'in, O.I., Il'ina, M.V., Kolomiytsev, A.S., Konoplev, B.G., Krasnoborodko, S.U., Polyakov, V.V.,

Smirnov, V.A., Solodovnik, M.S., Zamburg, E.G. Development of new metamaterials for advanced element base of micro- and nanoelectronics, and microsystem devices // Springer Proceedings in Physics, Volume 175, 2016, p. 563-580.

- N. Alyabyeva et al., “Modified cantilevers to probe unambiguously out-of-plane piezoresponse,” Phys. Rev. Mater., vol. 2, no. 6, Jun. 2018.
- I. N. Kots, A. S. Kolomiitsev, S. A. Lisitsyn, V. V. Polyakova, V. S. Klimin, and O. A. Ageev, “Studying the Regimes of Silicon Surface Profiling by Focused Ion Beams,” Russ. Microelectron., vol. 48, no. 2, pp. 72–79, Mar. 2019.
- A. A. Kuzharov et al., “The Influence of Stabilizer on the Formation and Tribotechnical Properties of Cu Nanoparticles,” Prot. Met. Phys. Chem. Surfaces, vol. 55, no. 2, pp. 283–287, Mar. 2019.
- S. A. Lisitsyn et al., “Study of Nanoscale Profiling Modes of GaAs Epitaxial Structures by Focused Ion Beams,” Nanotechnologies Russ., vol. 13, no. 1–2, pp. 26–33, Jan. 2018.
- I. Panchenko, N. Shandyba, A. Kolomiitsev, A. Gromov, and O. Ageev, “Investigation of the local profiling of the solid surfaces using focused ion beam,” in AIP Conference Proceedings, 2019, vol. 2064.

Professional Development, Advanced Training

- Certificate “DualBeam Basic Course” October 13-15, 2008 (FEI Company, Eindhoven, Netherlands)
- Certificate “DualBeam Advanced Course. Patterning” November 5-6, 2009 (FEI Company, Eindhoven, Netherlands)
- Certificate “DualBeam Advanced Course. TEM Sample Preparation” November 3-4, 2009 (FEI Company, Eindhoven, Netherlands)
- Certificate “DualBeam Training Course” February 21-23, 2011 (FEI Company, Eindhoven, Netherlands)
- Certificate "English for professional purposes", 2009 (Southern Federal University, Taganrog, Russia)
- Certificate "Improving foreign language communicative competence (English - advanced Level) administrative and managerial, scientific and pedagogical staff of SFedU", 2012 (Southern Federal University, Taganrog, Russia)
- Certificate of training at NT MDT company, 2007 (NT-MDT Company, Zelenograd, Russia)
- Certificate of professional training: «EDAX EBSD training course», 2008 (St. Petersburg State University, St. Petersburg, Russia)
- Certificate of professional training: «Focused ion beam technology at Nanofab complex», 2009 (NT-MDT Company, Zelenograd, Russia)
- Professional Training «The work with the FEI Dual beam analytical systems», 2011 (SMA Ltd., Moscow, Russia)
- Professional Training “Online Learning Technologies in Education” (72 hours), 2017, Southern Federal University, Russia
- Professional Training “Design and Mechanisms of Academic Programmes Implementation” (72 hours), Southern Federal University, 2016, Russia

Participation in Educational Exhibitions:

- 2010 – Rusnanoforum Moscow (Russia)
- 2011 – Rusnanoforum Moscow (Russia)

2019 – AULA Madrid (Spain)

Academic Visits

2019 – Brazil: Federal University of Rio de Janeiro, Rio de Janeiro State University, São Paulo State University (UNESP)

2019 – Argentina: University of Buenos Aires (UBA)

2018 – Spain: University of Cadiz

2018 – Spain: Polytechnic University of Madrid

Research projects

“Development of technology and prototyping of masks for deep X-ray lithography”

“Development the interactive remote access complex based on multifunctional equipment for the students to study nanomaterials”

“Development of a pilot project technical complex early detection, fire alarm, and the concentration of hazardous, toxic and harmful substances with automatic air purification in the protected area”

“Research project in the field of micro-and nanostructures based on oxide, organic and biological materials, development of production technologies for the development of promising sensors”

“The development of technological bases of submicron surface profiling using focused ion beams to create micro- and nanostructures”

“Design and technology of non-volatile memory devices based on memristors”

“Advanced field emission cathodes based on graphene on silicon carbide”

REFERENCES:

Provided upon request