

Dr Julia Syurik

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My research interests lie in the investigation of electro-physical and sensing properties of novel electronic devices with carbon nanostructures (CNT's and graphene). I am experienced in design and fabrication of chemical and temperature sensors based nanocomposites with carbon nanostructures. Moreover, I am skilled in the employment of a number of characterisation techniques such as AFM, SEM and DC conductivity measurements. I am enthusiastic about this area of research and my plan for the future is to continue investigating the results of my dissertation research and provide further contribution in the field of reproducible nanopositioning of CNT's for interconnections, nanotransistors and solar elements.



Education and Qualifications

- 2008 – 2012** **PhD in Electronics, Solid State Electronics, Radioelectronic Components, Micro and Nanoelectronics, Devices Based on Quantum Effects, Taganrog Institute of Technology, Southern Federal University Taganrog (SFedU), Russia**
- Thesis title: Development and study of technological basis for creation of films of polymer nanocomposites with carbon nanostructures for microelectronic sensors; supervisor: prof. Oleg A. Ageev; public defense on May 17th 2012
 - Comprehensive/prelim exams in electronics, philosophy and English language with grade A
- 2003 – 2008** **Engineer in Electronics, SFedU**
- Thesis title: Development of manufacturing technology for hardware components of nanoelectronics based on polyimide thin films; supervisor: prof. Oleg A. Ageev
 - This Dissertation was awarded a First Class Honors
- 2003 – 2007** **BSc in Nanotechnology, SFedU**
- Thesis title: Research and development of technological processes to produce structures of molecular electronics; supervisor: prof. Oleg A. Ageev
 - This dissertation was awarded a First Class Honors

Work and Research Experience

2013 - current **Postdoctoral researcher**

Institute of Microstructure Technology (IMT), Karlsruhe Institute of Technology (KIT), Germany

- Research in a new scanning probe microscopy technique, named "Cold Atom Scanning Probe Microscopy" (CA-SPM);
- Got a 3-years funding for research in fabrication of novel Hierarchical array of "Y"-shaped CNTs (YCNTs) and investigation of CNTs-based adhesive structures as Helmholtz postdoc;
- Participation in 6 conferences, including 4 conferences abroad;
- 3 peer reviewed publications.

2009 - 2012

Lead Engineer

REC “Nanotechnologies” of Southern Federal University, Taganrog, Russia

- Research in physical and electrical properties of polymer nanocomposites with graphene and CNT's;
- Techniques of Conductive AFM, Kelvin probe AFM, charge contrast SEM;
- Patent of Russian Federation: “Method of manufacturing of polymer nanocomposite with oriented array of carbon nanotubes with tunable density”.
- Simulations of parameters of composite's membranes for MEMS in Matlab;
- 1patent of Russian Federation “Method of manufacturing of polymer nanocomposite with oriented array of carbon nanotubes”.

2010 - 2011

Visiting PhD Student

Solid State Physics Group, University of Glasgow, Great Britain

- Engaged in extensive research in project entitled "Nanoscale Properties of Conductive Graphene/Polymer Composites";
- Operated Dual Beam system (SEM+FIB) for the preparation of nanocomposite samples for Transmitting Electron Microscopy;
- 1 peer reviewed publication.

2009 – 2010

Project Manager

REC “Nanotechnologies” of Southern Federal University, Taganrog, Russia

- Responsible for the project “Research and development of technology for producing of sensors based on polymer nanocomposites with carbon nanostructures for environmental monitoring systems” connected to the Russian Federal Target program;
- 1 peer reviewed publication, 2 patents of Russian Federation.

Jul-Aug 2010

Visiting PhD Student

Laboratory of Materials and Interface Chemistry of the Eindhoven University of Technology, the Netherlands

- Research of conductive characteristics of the conductive polymer nanocompounds, learned the technique of reconstruction of materials' properties based on combination of microtome and AFM-microscope;
- Research of mechanical characteristics of the polymer nanocompounds, learned the technique of AFM-based nanoindentation;
- 1 peer reviewed publication.

2008 – 2012

PhD Student

Department of Micro-and Nanoelectronics, Taganrog Institute of Technology, Southern Federal University Taganrog, Russia

- Research in creation of technological basis for manufacturing of polymer nanocomposites with graphene and carbon nanotubes with low percolation thresholds;
- Research in chemical sensing of polymer nanocomposites with graphene and carbon nanotubes ;
- 4 Peer reviewed publications and 25 conference presentations and posters.

2007 – 2009

Engineer

REC “Nanotechnologies” of Southern Federal University, Taganrog, Russia

- Study of technology of structures' formation for molecular electronics based on polymer films;
- Langmuir-Blodgett technique, centrifuge, Mathcad;
- 3 publications in conferences symposia.

2006 – 2007

Research Assistant

**Department of Micro-and Nanoelectronics, Taganrog Institute of Technology,
Southern Federal University Taganrog, Russia**

- Research in optimization of technological parameters of centrifugation based on polyimide films;
- Developed a device of polyimide-based Mask for X-ray lithography for LIGA-technology (patent of Russian Federation);
- Statistical analysis of experimental data;
- Excel; Mathcad.

Community Involvement/Administrative Activity

- Professor Assistant in training Bachelor and Master students of Material Science;
- Responsible for organizing meetings at the Department of Micro-and Nanoelectronics;
- Member of the administrative committee for the conference “Nanotechnologies-2010”, September 2010 Gelendgik, Russia;
- Member of the Youth Scientific Council at Taganrog Institute of Technology;
- Member of the Innovative group of the Youth Scientific Council;
- Received the grant and was a project manager with 14 people in my team for 2 years;
- Responsible for monitoring projects and grants;
- Tutor and consultant in writing up proposals for grants under Russian Federal Target Program at the Department of Micro-and Nanoelectronics;
- Member of Young Investigators Network (YIN) of Karlsruhe Institute of Technology.

Publications, Presentations and Abstracts

Peer reviewed publications

1. Syurik J., Alyabyeva N., Alekseev A., Ageev O.A. AFM-based model of percolation in graphene-based polymer nanocomposites. *Composites Science and Technology*. V. 95, 2014, P. 38-43, <http://dx.doi.org/10.1016/j.compscitech.2014.02.006>. ISSN 0266-3538, IF 2.856
2. Alekseev A., Efimov A., Loos J., Matsko N., Syurik J. Three-dimensional imaging of polymer materials by Scanning Probe Tomography. *European Polymer Journal*. V. 52, 2014, P. 154-165, <http://dx.doi.org/10.1016/j.eurpolymj.2014.01.003>, ISSN 0014-3057, IF 3.07
3. Syurik J., Ageev O.A., Cherednichenko D.I., Konoplev B.G., Alexeev A. Non-linear conductivity dependence on temperature in graphene-based polymer nanocomposite. *Carbon*, 2013, N63, P. 317-323, <http://dx.doi.org/10.1016/j.carbon.2013.06.084>, ISSN 0008-6223, IF 5.868
4. Syurik J., Ageev O.A., Alexeev A. Graphene-based polymer nanocomposites: imaging of 3-D graphene network in a polymer matrix using SEM. Chapter in *Nano- and Piezoelectric Technologies, Materials and Devices*, Editor: Ivan A. Parinov. Series: Physics Research and Technology Nanotechnology Science and Technology, Nova Science Publishers, 2013, https://www.novapublishers.com/catalog/product_info.php?products_id=46130&osCsid=975e8b6c6cafd033b2ddfc1b78bb0a0b, ISBN 978-1-62948-230-9
5. Syurik, Y. V., Ghislandi, M. G., Tkalya, E. E., Paterson, G., McGrouther, D., Ageev, O. A. and Loos, J. Graphene Network Organisation in Conductive Polymer Composites. *Macromol. Chem. Phys.* 2012, V 213, N 12, P. 1251–1258, <http://dx.doi.org/10.1002/macp.201200116>, ISSN 1022-1352, IF 2.386
6. Alekseev A., Chen D., Tkalya E. E., Ghislandi M. G., Syurik Yu.V., Ageev O., Loos J., With G. De. Local organization of graphene network inside graphene/polymer composites. *Advanced Functional Materials*. 2012, V 22, N 6, P.1311-1318, <http://dx.doi.org/10.1002/adfm.201101796>, ISSN: 1616-301X, IF 9.765
7. Syurik Yu.V., Smirnov V.A., Varzarev Yu.N., Ageev O.A. Study of electrical properties of graphene-based polymer nanocomposites. *SFU-News. Technical science*. N 4, 2011, Taganrog, Russia, P. 77-86 (in Russian), IF 0.144
8. Ageev O.A., Syurik Yu.V., Kolomytcev A.S., Serbu N.I. Influence of concentration of carbon nanostructures on resistivity of polymer nanocomposite's films. *Journal of Nano and Microsystem Technique*. 2010, N 10, P. 2-6 (in Russian), ISSN 1684-6419, IF 0.250
9. Ageev O.A., Syurik Yu.V., Fedotov A.A., Klimin V.S. Production of polymer nanocompounds with multifunctional modular nanotechnological platform NANOFAB NTK-9. *SFU-News. Technical science*. 2009, N 1, Taganrog, Russia, P. 135-142 (in Russian), IF 0.144

Patents

1. Syurik Yu.V., Konoplev B.G., Ageev O.A. Method of manufacturing of polymer nanocomposite with oriented array of carbon nanotubes. Patent of the Russian Federation N 2417891, 2009
2. Syurik Yu.V., Konoplev B.G., Ageev O.A. Method of manufacturing of polymer nanocomposite with oriented array of carbon nanotubes with tuneable density. Patent of the Russian Federation N 2011118647, 2011
3. Syurik Yu.V., Ageev O.A. Method for the manufacturing of nanocomposite polymer/CNTs on a substrate. Patent of the Russian Federation N 2400462, 2009
4. Syurik Yu.V., Konoplev B.G., Ageev O.A. Magnetic sensor. Patent of the Russian Federation N 102813, 2010
5. Konoplev B.G., Ageev O.A., Syurik Yu.V. et al. Mask for X-ray lithography for LIGA-technology. Patent of the Russian Federation N 88187, 2009

Conference presentations

1. Syurik J., Günther A., Federsel P., Bell S., Fortágh F., Hölscher H., Yocto-range Force Resolution by Cold Atom Scanning Probe Microscopy. 4th International Workshop on Advanced Atomic Force Microscopy Techniques, Karlsruhe, Germany. 4-5 March 2013
2. Syurik J., Röhrig M., Ilin O.I., Fedotov A.A., Ageev O.A., Hölscher H., YCNTs- based Gecko-inspired Adhesion Surfaces, Scientific Workshop of the COST Action TD0906 WG3 & WG4, , Cluj Napoca, Romania. 9-11 April 2013
3. Syurik J., Röhrig M., Ilin O.I., Fedotov A.A., Ageev O.A., Hölscher H., “Y”-shaped CNT- based Gecko-inspired Adhesion Surfaces, Gordon Research Conference in Adhesion, USA. 13-19 July 2013
4. Federsel P., Günther A., Syurik S., Bell S., Fortágh J., and Hölscher H. Cold Atom Scanning Probe Microscopy. WE-Heraeus Seminar on "Interactions with the Nanoworld: Local Probes with High Time, Energy and Force Resolution", Physikzentrum Bad Honnef, Germany. 11 – 13 November 2013
5. Syurik J., Wolf J., Albakri B., Schneider M., Hölscher H. E-tuned Nano- and Microhairs for Bio-inspired Adhesives. 2nd International Conference on Biological and Biomimetic Adhesives, Marmara University, Istanbul, Turkey. 6-9 May 2014
6. Syurik J., Wolf J., Albakri B., Schneider M., Hölscher H. Porous Nano- and Microhairs for Bio-inspired Adhesives. Gordon Research Conference “Recent Advances in Understanding the Structures and Properties of Nanomaterials”, the Chinese University of Hong Kong, Hong Kong, China. 20-25 July 2014

The full list of 36 conference presentations could be send by request.

References:

- 1 **Professor Dr. Oleg Ageev** – Director of REC “Nanotechnologies”, Dean of the faculty of Electronics and Engineering, Southern Federal University, 347928, Nekrasovsky st., 44, Taganrog, Russia, +7(8634)371611; E-mail: ageev@sfnu.ru ;
- 2 **Professor Dr. Joachim Loos** a)School of Physics and Astronomy, Kelvin Nanocharacterisation Centre and Scottish University Physics Alliance, University of Glasgow, University Avenue, Glasgow G128QQ,United Kingdom ;b) DSM Resolve, Urmonderbaan 22, 6167 RD Geleen, the Netherlands, +31(0)6 13317196, E-mail: Joachim.Loos@dsm.com;
- 3 **PD Dr. Hendrik Hölscher** – Group leader in the Institute of Microstructure Technology of Karlsruhe Institute of Technology, 76344, Hermann-von-Helmholtz-Platz 1, Eggenstein-Leopoldshafen, Germany, Phone: +49 721 608-22779; E-mail: hendrik.hoelscher@kit.edu.