
Dr. Tatiana Kolesnikova

Jacobs University Bremen gGmbH
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Nationality: Russian
Place of Birth: Saratov, Russia
Date of Birth: 16/04/1985

Research Interests

- Functional nanomaterials and nanostructures
- Nano- and molecular technology of inorganic/organic composites
- Spherical and planar interfaces: polyelectrolyte capsules, films and their manipulation
- Biomaterials for drug delivery
- Nanoengineered surfaces for biosensing

Education

- 10/2007 – 11/2010 Saratov State University, Saratov, Russia**
PhD in Biophysics
In cooperation with the Max-Planck-Institut für Kolloid- und Grenzflächenforschung, Potsdam, Germany
Title: Ultrasound-sensitive nanocomposite microcapsules and their interaction with biological systems
- 09/2002 – 07/2007 Saratov State University, Saratov, Russia**
Diploma in Physics (Distinction with Honors)
Specialization: Microelectronics and Solid-State Electronics
Title: Investigation of microcapsule sensitivity to the ultrasound depending on shell structure and composition
- 09/1992 – 06/2002 Secondary School N76, Municipal Institution of General Education, Saratov, Russia**
Secondary (General) Education
Silver medal (Distinction with Honors), ranked in the top 1% of the graduating class

Professional Experience

- 12/2012 to date Jacobs University Bremen, Bremen, Germany**
Postdoctoral Fellow
Group: Biophysics (Prof. Dr. Mathias Winterhalter)
BMBF-project: Strategieprozess Biotechnologie 2020+. Prozessüberwachung in vitro und in vivo mit Polyelektrolyt-Nanokapseln. The project is highly transdisciplinary and bridges together Biophysics, Biochemistry and Biotechnology; running in a cooperation between Jacobs University and Hochschule Bremen
- 03/2011 – 11/2012 Max-Planck-Institut für Kolloid- und Grenzflächenforschung, Potsdam, Germany**
Postdoctoral Fellow
Group: Optical Manipulation of Capsules and Films (Prof. Dr. Andre Skirtach)
Topic: Structured Substrates for SERS
My project was focused on engineering of nanoparticle-based surfaces for manipulation of cells by laser light
- 03/2009 – 11/2010 Max-Planck-Institut für Kolloid- und Grenzflächenforschung, Potsdam, Germany**
Research Associate
Group: Active Interfaces and Coatings (Prof. Dr. Dmitry Shchukin)
Besides being responsible for my main PhD project, I was involved in a several sub-projects simultaneously:
03/2009: EU project MatSILC - New materials for solid oxide fuel cells
10/2009-03/2010: Deutscher Akademischer Austausch Dienst (DAAD) Research Fellowship
04/2010-11/2010: EU-project NanoHy - Fabrication of bioactive coatings based on nanocontainers
- 02/2009 – 11/2010 Saratov State University, Saratov, Russia**
Lead Engineer, Laboratory of Nanostructures and Microcapsules, Institute of Nanostructures and Biosystems, Division of Nanotechnology
- 05/2006 – 08/2008 Saratov State University, Saratov, Russia**
Laboratory Assistant and Engineer, Institute of Mechanics and Physics, Physics Department

Teaching Experience

- 12/2012 to date Research Supervisor, Jacobs University Bremen, Germany**
Supervision of undergraduate (B.Sc.), graduate (M.Sc.) and PhD students

09/2013 – 05/2015 Lecturer, Jacobs University Bremen, Germany

Lecture courses “560312 High-Throughput Screening Technology II” for undergraduate students of the Biotech program (Spring and Fall 2015) and “530443 Biomembranes and Materials Science” for graduate students of the MoLife Master program (Fall 2013)

10/2007 – 11/2010 Teaching assistant, Saratov State University, Russia

Practical course “Physical chemistry of materials and processes in electronic engineering” (Fall 2007)
Laboratory course “Semiconductor Physics and Microelectronics” for graduate students of Nano- and Biomedical Technology Department (Spring 2008-Spring 2009)

Scholarships and Awards

05/2014

The Best Presentation Award

V International Workshop "Nanoparticles, nanostructured coatings and microcontainers: technology, properties, applications", Ghent University, Ghent, Belgium

Title: Spherical and planar interfaces in biosensing: detection principle based on proximity induction

03/2012

News Release

Materialwissenschaften: Material, Technik, Mikropartikel. Ein Baukasten für Nanotransporter // Max-Planck Forschung, Das Wissenschaftsmagazin der Max-Planck-Gesellschaft, March, 2012, pp. 63-68

10/2009-03/2010

Research DAAD Fellowship

Research Fellowship of Deutscher Akademischer Austausch Dienst (DAAD) and Ministry of Education and Science of Russian Federation; cooperation program "Michail Lomonosov II", Max-Planck Institute of Colloids and Interfaces, Potsdam, Germany

09/2011

The Best Presentation Award

2nd International School "Nanomaterials and Nanotechnologies in Living Systems. Safety and Nanomedicine", Moscow Region, Russia

Title: Nanocomposite microcapsules functionalized by zinc oxide nanoparticles: fabrication, physical properties, biocompatibility, toxicity

07/2009

The Best Poster Award

1st International Summer School "Nanomaterials and Nanotechnologies in Living Systems", Moscow region, Russia

Title: Fabrication of ultrasound-sensitive polyelectrolyte microcapsules functionalized by magnetite nanoparticles

Publications

The most significant publications:

- Verma S.K., Amoah A., Schellhaas U., Winterhalter M., Springer S., [Kolesnikova T.A.](#) “To catch or not to catch”: Microcapsule-based sandwich assay for detection of proteins and nucleic acids // *Advanced Functional Materials*, **2016**, Vol. 26, pp. 6015-6024
- Elsayed K.N.M., [Kolesnikova T.A.](#), Abdelrahman A.M., Winkelmann D., Klöck G. Isolation and characterization of thermo-tolerant Egyptian marine microalgae as candidates for biodiesel production // *Bioprocess and Biosystems Engineering*, **2016** (In press)
- Dirscherl C., Palankar R., Delcea M., [Kolesnikova T.A.](#), Springer S. Conformation-specific capture of major histocompatibility complex class I molecules by antibody-micropatterns allows for a novel peptide binding assay in live cells // *Small*, **2016** (Under revision)
- [Kolesnikova T.A.](#), Kiragosyan G., Le T., Springer S., Winterhalter M. Specific targeting of MHC class I proteins in living cells with polyelectrolyte microcapsules // **2016** (In preparation)
- [Kolesnikova T.](#), Palankar R., Winterhalter M. Polymer capsules and electroporation // *IFMBE Proceedings*, **2015**, Vol. 45, pp. 789-792
- [Kolesnikova T.](#), Kroll C., Verma S.K., Klöck G., Springer S., Winterhalter M. Polyelectrolyte microcapsule based assay for monitoring biotechnological processes in vitro and in vivo // *Biophysical Society 58th Annual Meeting, Biophysical Journal*, **2014**, Vol. 106(2), Suppl. 1, p. 621a
- Palankar R., Pinchasik B.-E., Khlebtsov B.N., [Kolesnikova T.A.](#), Möhwald H., Winterhalter M., Skirtach A.G. Nanoplasmonics for monitoring of transient nanopores and rupture of lipid membrane by ion current // *Nano Letters*, **2014**, Vol. 14, pp. 4273-4279
- Peterson A.M., Pilz-Allen C., [Kolesnikova T.](#), Möhwald H., Shchukin D. Bone morphogenetic protein 2 and basic fibroblast growth factor release from polyelectrolyte coated titanium for implant applications // *ACS Applied Materials & Interfaces*, **2014**, Vol. 6, No. 3, pp. 1866-1871 (Cover Page)
- [Kolesnikova T.A.](#), Skirtach A.G., Möhwald H. Red blood cells and polyelectrolyte multilayer capsules: Natural carriers versus polymer-based drug delivery vehicles // *Expert Opinion on Drug Delivery*, **2013**, Vol. 10, No. 1, pp. 47-58

- [Kolesnikova T.A.](#), Kohler D., Skirtach A.G., Möhwald H. Laser-induced cell detachment, patterning and regrowth on gold nanoparticle functionalized surfaces // ACS Nano, **2012**, Vol. 6, No. 11, pp. 9585-9595
- [Kolesnikova T.A.](#), Akchurin G.G., Portnov S.A., Khomutov G.B., Akchurin G.G., Naumova O.G., Sukhorukov G.B., Gorin D.A. Visualization of magnetic microcapsules in liquid by optical coherent tomography and controlling their arrangement using magnetic field // Laser Physics Letters, **2012**, Vol. 9, pp. 643-648
- [Kolesnikova T.A.](#), Gorin D.A., Fernandes P., Kessel S., Khomutov G.B., Fery A., Shchukin D.G., Möhwald H. Nanocomposite microcontainers with high ultrasound sensitivity // Advanced Functional Materials, **2010**, Vol. 20, pp. 1189-1195
- Gorin D.A., Yashchenok A.M., Manturov A.O., [Kolesnikova T.A.](#), Möhwald H. Effect of Layer-by-Layer electrostatic assemblies on the surface potential and current voltage characteristic of MIS structures // Langmuir, **2009**, Vol. 25, No. 21, pp. 12529-12534, etc.

Patents:

- Springer S., Verma S.K., [Kolesnikova T.A.](#) Detektion von Analyten unterschiedlicher Art mit Mikrokügelchen im Durchflusssystem // Invention Report - P01083.ERF/JE, 31.12.2015
- Akchurin G.G., Akchurin G.G., Gorin D.A., [Kolesnikova T.A.](#), Portnov S.A., Skirtach A.G., Sukhorukov G.B. Khlebtsov B.N., Khlebtsov N.G. Selective destruction of cancer cells via magnetic microcontainers containing photodynamic or photothermic dyes // Russian Federation Patent - 2009106672/14(008911), 01.04.2010

Book chapter:

- Inozemtseva O.A., Portnov S.A., [Kolesnikova T.A.](#), Gorin D.A., Sukhorukov G.B. Layer by Layer microencapsulate technology as basis for fabrication of drug delivery nanosystems with remote controlling properties // Handbook of Materials for Nanomedicine (Vol. 1, Ch. 3), 2010, World Scientific Pub Co., 840 p.

Laboratory Skills

Characterization techniques

Confocal microscopy (Leica DM RXA2, Zeiss LSM500 and LSM700); atomic force microscopy (Integra Spectra); dynamic light scattering (Malvern Instruments); FT-IR (Bruker); UV-Vis and fluorescence spectroscopy (Cary Varian); flow cytometry (CyFlow Space, Partec; Amnis ImageStreamX Mark II, Millipore); fluorescence and phase-contrast microscopy (Zeiss); ellipsometry

Analytical techniques

TLC; gel permeation chromatography (Sephadex G-50); Stewart assay; fluorescence spectroscopic assays; anisotropy binding assays; protein expression and purification; protein labeling («click-chemistry», EDC/sulfo-NHS chemistry); ELISA; SDS-PAGE; Bradford assay

Other techniques

Langmuir-Blodgett (LB) and Layer-by-Layer (LbL) techniques; spin-/deep-coating; LbL assembly of polyelectrolyte microcapsules; ultrasound-assisted preparation of «oil-in-water» emulsions; preparation of liposomes (extrusion, electroformation); semiconductor photolithography (SU-8 photoresist); operation of plasma cleaner and UV mask aligner; microcontact printing; cell culture preparation and analysis (RMA, Vero, STF1 cells)

Personal Skills

Languages:

Russian: native proficiency

English: full professional proficiency

German: elementary proficiency

PC Knowledge:

OS Windows / Macintosh / Linux (basic knowledge), MS Office, EndNote, Adobe Photoshop, Adobe Illustrator, CorelDraw, Origin, ChemDraw, Image J and general analytical, processing and scientific software

Driving license:

AM/B/L (Führerschein Bundesrepublik Deutschland)

Interests:

Sports, travelling, digital photography, clothes design and sewing