

Vladimir Grachev

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Keywords

cellulose nanocrystals; nanocellulose; self-assembly; liquid crystals; thermodynamics; diffusion; light scattering; small angle scattering; gelation; ionic strength; colloidal stability; aggregation; nanoplastics; ionic liquids

Education

Lomonosov Moscow State University (Moscow, Russia), Department of Chemistry, Subdivision of Colloid Chemistry (September 1, 2012 - June 26, 2018)

Qualification: Chemist. Lecturer in Chemistry (equivalent to M. Sc. in Chemistry)

Title of diploma: Effect of electrolyte solutions on the mechanical properties of various types of cellulose

KU Leuven (Leuven, Belgium), Faculty of Engineering Science (August 16, 2019 - May 28, 2024)

Qualification: Doctor of Engineering Science (PhD) - Chemical Engineering

Title of PhD thesis: Cellulose nanocrystals in aqueous salt solutions

Employment

Max Planck Institute for Polymer Research (Mainz, Germany), Department of Molecular Spectroscopy (July 13, 2018 - March 31, 2019)

Function: visiting researcher

KU Leuven (Leuven, Belgium), Faculty of Engineering Science (August 16, 2019 - May 28, 2024)

Function: PhD student

University of Szeged (Szeged, Hungary), Faculty of Physical Chemistry and Materials Science (November 14, 2024 – current)

Function: postdoctoral researcher

Publications

1. Z.N. Skvortsova, V.Yu. Traskin, **V.S. Grachev**, T.I. Gromovykh. The Influence of Electrolyte Solutions on the Mechanical Properties of Bacterial Cellulose. *Colloid Journal* 2020, 82, 475-478. doi:10.1134/S1061933X20030138
2. Z.N. Skvortsova, T.I. Gromovykh, **V.S. Grachev**, V.Yu. Traskin. Physicochemical Mechanics of Bacterial Cellulose. *Colloid Journal* 2019, 81, 366-376. doi:10.1134/S1061933X19040161
3. P. Canepa, G. Gonella, G. Pinto, **V. Grachev**, M. Canepa, O. Cavalleri. Anchoring of Aminophosphonates on Titanium Oxide for Biomolecular Coupling. *J. Phys. Chem. C* 2019, 123, 27, 16843-16850. doi:10.1021/acs.jpcc.9b04077
4. **V. Grachev**, S. Lombardo, C. Bartic, W. Thielemans. Thermodynamics of interactions between cellulose nanocrystals and monovalent counterions. *Carbohydrate Polymers* 2024, 333, 121949. doi:10.1016/j.carbpol.2024.121949
5. **V. Grachev**, O. Deschaume, P.R. Lang, M.P. Lettinga, C. Bartic, W. Thielemans. Dimensions of Cellulose Nanocrystals from Cotton and Bacterial Cellulose: Comparison of Microscopy and Scattering Techniques. *Nanomaterials* 2024, 14(5), 455. doi:10.3390/nano14050455

Participation in conferences and symposia

PSCM User Meeting, Grenoble, France (date: March 4-6, 2024)

Oral presentation: Phase behaviour of cotton-derived cellulose nanocrystals in water and in the presence of salts

CRF - Chemical Research in Flanders, Blankenberge, Belgium (date: October 12-14, 2022)

Poster presentation: Phase separation and stability of cotton and bacterial cellulose nanocrystals in the presence of various salts

8th EPNOE Junior Scientist Meeting, Aveiro, Portugal (date: September 8-9, 2022)

Poster presentation: Phase separation and stability of cotton and bacterial cellulose nanocrystals in the presence of various salts

Research mobility

Depolarized DLS experiments conducted in IBI-4, Forschungszentrum Jülich, Jülich, Germany (date: November 29 - December 17, 2021)

Depolarized DLS experiments conducted in IBI-4, Forschungszentrum Jülich, Jülich, Germany (date: November 7-18, 2022)

Skills

Laboratory skills:

- a) general synthesis of nanocellulose (acid hydrolysis, centrifuging, dialysis, ultrasonic treatment, filtration), including water-based cellulose modifications;
- b) light scattering, including multi-angular DLS, depolarized DLS and electrophoretic light scattering (ELS);
- c) isothermal titration calorimetry (ITC);
- d) thermogravimetric analysis (TGA) of liquid and solid samples;
- e) small-angle X-ray scattering (SAXS) of liquid samples;
- f) FTIR in transmission and reflection modes;
- g) imaging techniques for contact angle determination and in polarization mode;
- h) conductometric and pH titration;
- i) organic elemental analysis in carbon-hydrogen-nitrogen-sulfur mode (EA-CHNS);
- j) optical microscopy, including confocal microscopy for particle-tracking microrheology;
- k) rheological analysis (bulk rheometry, particle-tracking microrheology);
- l) ultraviolet-visible spectroscopy (UV-vis), including turbidimetry;
- m) lyophilization of liquid samples;
- n) general mechanical tests of solid samples (uniaxial tensile test, longevity under loading test);
- o) contact angle determination of surface energy (angle on a flat surface, advancing and receding angles, selective wetting, interfacial tension);
- p) SFG on solid-air and solid-liquid interfaces

Language skills:

- a) Russian (native);
- b) English (level C1 confirmed by IELTS test, Düsseldorf, Germany, May 4, 2019);
- c) German (estimated B1);
- d) French (estimated A2);
- e) Dutch, Italian (basic knowledge)

Other experience

Bio-Organic Chemistry course, Department of Chemistry, KU Leuven KULAK, Kortrijk, Belgium

Period: March 1, 2022 - April 15, 2022

Function: lab session co-surveillant

Physico-Chemistry of Dispersive Systems course, Department of Materials Science, Lomonosov Moscow State University, Moscow, Russia

Period: September 1, 2017 - December 31, 2017

Function: lab session surveillant