

Valentin Rodionov

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Professional Experience

- Case Western Reserve University** Jul 2018 – present
Assistant Professor at the Department of Macromolecular Science and Engineering.
- King Abdullah University of Science and Technology (KAUST)** Oct 2010 – Jun 2018
Assistant Professor of Chemical Science.
- University of California, Berkeley and Lawrence Berkeley National Laboratory** Oct 2008 - Aug 2010
Postdoctoral Research Fellow with Professor J.M.J. Fréchet.
Design, synthesis, and characterization of enzyme-inspired star polymers for catalysis.
- Northwestern University** Feb 2008 - Jul 2008
Postdoctoral Research Fellow with Professor B.A. Grzybowski.
Development and characterization of photo- and thermoresponsive Pickering emulsions.

Education and Training

- The Scripps Research Institute** Jul 2002 – Dec 2007
Graduate studies in chemistry under the guidance of Professor M.G. Finn.
Thesis title: "Mechanistic Investigation of Copper(I)-Catalyzed Azide-Alkyne [3+2] Cycloaddition".
PhD degree awarded May 2008.
- University of Maryland, College Park** Sep 2000 – Jun 2002
Graduate studies in chemistry under the guidance of Professor J.T. Davis.
Synthesis of Tröger's base derivatives for applications in molecular recognition and asymmetric phase transfer catalysis. MS degree in chemistry awarded May 2002.
- Higher Chemical College of the Russian Academy of Sciences, Moscow, Russia** 1997-1999
Undergraduate studies in chemistry.
- N.D. Zelinsky Institute of Organic Chemistry, Moscow, Russia** 1996-1999
Undergraduate research associate.
Multistep oligosaccharide synthesis, focusing on protected derivatives of glucuronic acid.
- Moscow Chemical Lyceum, Moscow, Russia** 1994-1997
Basic studies in chemistry, physical sciences, and humanities. Graduation thesis research performed at the N.D. Zelinsky Institute of Organic Chemistry. Title of graduation thesis: "Efficient Synthesis of Selectively Protected Allyl-3-O-(Methyl- β -D-Glucopyranosyluronate)- β -D-Galactopyranoside".

Research Interests

Catalysis with Soft Materials:

- Catalytic surfactants and polymers
- Complex macromolecular architectures for catalysis
- Ligand-mediated nanocatalysis

Systems Chemistry:

- Self-replication of micelles and vesicles
- Dissipative systems and dynamic self-assembly

Teaching Interests

Introductory organic chemistry.
Physical organic chemistry.
Supramolecular chemistry and self-assembly.

Publications

PhD and Postdoctoral Career

1. "Mechanism of the Ligand-Free Cu(I)-Catalyzed Azide-Alkyne Cycloaddition Reaction" Rodionov, V.O.; Fokin, V.V.; Finn, M.G. *Angew. Chem. Int. Ed.* 2005, **44**, 2210-2215.
[This work has been featured on the cover of *Angewandte Chemie* and highlighted in *Chemical & Engineering News*, Feb. 21, 2005, p. 36.](#)
2. "Benzimidazole and Related Ligands for Cu-Catalyzed Azide-Alkyne Cycloaddition" Rodionov, V.O.; Presolski, S.I.; Gardinier, S.; Lim, Y.-H.; Finn, M.G. *J. Am. Chem. Soc.* 2007, **129**, 12696-12704.
3. "Ligand-Accelerated Cu-Catalyzed Azide-Alkyne Cycloaddition: a Mechanistic Report" Rodionov, V.O.; Presolski, S.I.; Diaz D.D.; Fokin, V.V.; Finn, M.G. *J. Am. Chem. Soc.* 2007, **129**, 12705-12712.
4. "Transition-Metal-Free Catalytic Synthesis of 1,5-Diaryl-1,2,3-triazoles" Kwok, S.W.; Fotsing, J.R.; Fraser, R.J.; Rodionov, V.O.; Fokin, V.V. *Org. Lett.* 2010, **12**, 4217-4219.
5. "Easy Access to a Family of Polymer Catalysts from Modular Star Polymers" Rodionov, V.O.; Gao, H.; Scroggins, S.; Unruh, D.A.; Avestro, A.J.; Fréchet J.M.J. *J. Am. Chem. Soc.* 2010, **132**, 2570-2572.

Independent Research

6. "Update: An Efficient Synthesis of Poly(ethylene glycol)-Supported Iron(II) Porphyrin Using a Click Reaction and its Application for the Catalytic Olefination of Aldehydes" Chinnusamy T.; Rodionov V.O.; Kühn F.E.; and Reiser O. *Adv. Synth. Catal.* 2012, **354**, 1827-1831
7. "Sequence-Controlled Copolymers of 2,3,4,5,6-Pentafluorostyrene: A Mechanistic Insight and Application to Organocatalysis" O'Shea J.-P.; Solovyeva V.; Guo X.; Zhao J.; Hadjichristidis N.; and Rodionov V.O. *Polym. Chem.* 2014, **5**, 698-701
8. "Star Block-Copolymers: Enzyme-Inspired Catalysts for Oxidation of Alcohols in Water" Mugemana C.; Chen B.-T.; Bukhryakov K.V.; and Rodionov V.O. *Chem. Comm.* 2014, **50**, 7862-7865
9. "One-Pot Synthesis of Au@SiO₂ Catalysts: A Click Chemistry Approach" Solovyeva V.A.; Vu K.B.; Merican Z.; Sougrat R.; and Rodionov V.O. *ACS Comb. Sci.* 2014, **16**, 513-517
[This work has been featured on the cover of *ACS Comb. Sci.* \(October 2014\)](#)
10. "Nanocapsules with Fluorous Filling: A "Molecular Zipper" Approach" Merican Z.; Mugemana C.; Almahdali S.; Vu K.B.; O'Shea J.-P.; Sougrat R.; and Rodionov V.O. *J. Polym. Sci. A: Polym. Chem.* 2015, **53**, 215-218
11. "Perfluorinated Cobalt Phthalocyanine Effectively Catalyzes Water Electrooxidation" Morlanés N.; Joya K.S.; Takanabe K.; and Rodionov V.O. *Eur. J. Inorg. Chem.* 2015, **1**, 49-52.
12. "Cooperative Catalysis with Block-Copolymer Micelles: a Combinatorial Approach" Bukhryakov K.V.; Desyatkin V.G.; O'Shea J.-P.; Almahdali S.; Solovyeva V.; and Rodionov V.O. *ACS Comb. Sci.* 2015, **17**(2), 76-80.
[This work has been highlighted in *Chemical & Engineering News*, Jan. 19, 2015, p. 24.](#)
13. "Enzyme-inspired Functional Surfactant for Aerobic Oxidation of Activated Alcohols to Aldehydes in Water" Chen B.-T.; Bukhryakov K.V.; Sougrat R.; and Rodionov V.O. *ACS Catalysis* 2015, **5**(2), 1313-1317.
14. "Surface-Bound Ligands Modulate Chemoselectivity and Activity of a Bimetallic Nanoparticle Catalyst" Vu K.B.; Bukhryakov K.V.; Anjum D.H.; and Rodionov V.O. *ACS Catalysis* 2015, **5**(4), 2529-2533.
15. "Amplification of Chirality through Self-Replication of Micellar Aggregates in Water" Bukhryakov K.V.; Almahdali S.; and Rodionov V.O. *Langmuir.* 2015, **31**(10), 2931-2935
16. "Immobilization of Molecular Cobalt Electrocatalyst by Hydrophobic Interaction with Hematite Photoanode for Highly Stable Oxygen Evolution" Joya K.S.; Morlanés N.; Maloney E.; Rodionov V.O.; and Takanabe K. *Chem. Comm.* 2015, **51**, 13481-13484
17. "Palladium N-Heterocyclic Carbene Precatalyst Site Isolated in the Core of a Star Polymer" Bukhryakov K.V.; Mugemana C.; Vu K.B.; and Rodionov V.O. *Org. Lett.* 2015, **17** (19), 4826-4829
18. "Mining chemical activity status from high-throughput screening assays" Othman S.; Ba-alawi W.; Afeef M.; Essack M.; Rodionov V.; Kalnis P.; and Bajic V.B. *PLoS One* 2015; doi:10.1371/journal.pone.0144426
19. "Simultaneous Reduction of CO₂ and Splitting of H₂O by a Single Immobilized Cobalt Phthalocyanine Electrocatalyst" Morlanés N.; Takanabe K.; and Rodionov V.O. *ACS Catalysis* 2016, **6**, 3092-3095
20. "Ring opening metathesis polymerization of cyclopentene using a ruthenium catalyst confined by a branched polymer architecture" Mugemana C.; Bukhryakov K.V.; Bertrand O.; Vu K.B.; Gohy J.-F.; Hadjichristidis N.; and Rodionov V.O. *Polym. Chem.* 2016, **7**, 2923-2928
[This work has been featured on the cover of *Polym. Chem.* \(April 2016\)](#)

21. "Cooperative Organocatalysis of Mukaiyama-Type Aldol Reactions by Thioureas and Nitro Compounds" Bukhryakov K.V.; Desyatkin V.; and Rodionov V.O. *Chem. Comm.* 2016, **52**, 7576–7579
22. "Controllable Catalysis with Nanoparticles: Bimetallic Alloy Systems and Surface Adsorbates" Chen T. and Rodionov V.O. *ACS Catalysis* 2016, **6**, 4025–4033
23. "An Efficient and Stable Hydrophobic Molecular Cobalt Catalyst for Water Electrooxidation at Neutral pH" Chen B.-T.; Morlanés N.; Adogla E.; Takanahe K.; and Rodionov V.O. *ACS Catalysis* 2016, **7**, 4647–4652
24. "Hollow Nanospheres with Fluorous Interiors for Transport of Molecular Oxygen in Water" Vu K.B.; Almahdali S.; Bukhryakov K.V.; and Rodionov V.O. *ChemistrySelect* 2016, **1**(12), 3306-3309, DOI:10.1002/slct.201600602
25. "Polystyrene-supported Cu(II)-R-Box as recyclable catalyst in asymmetric Friedel-Crafts reaction" Desyatkin V.G.; Anokhin M.V.; Rodionov V.O.; and Beletskaya I.P. *Russ. J. Org. Chem.* 2016, **52**(12), 1717-1727
26. "pH-Sensitive Amphiphilic Block-Copolymers for Transport and Controlled Release of Oxygen" Patil Y.; Almahdali S.; Vu K.B.; Zapsas G.; Hadjichristidis N.; and Rodionov V.O. *Polym. Chem.* 2017, **8**, 4322-4326
This work has been featured on the cover of Polym. Chem. (August 2017)
27. "Thiols Make for Better Catalysts: Au Nanoparticles Supported on Functional SBA-15 for Catalysis of Ullmann-type Homocouplings" Chen T.; Chen B.-T.; Bukhryakov K.V.; and Rodionov V.O. *Chem. Comm.* 2017, **53**, 11638-11641
This work has been featured on the cover of Chem. Comm. (October 2017)
28. "A Novel Poly(vinylidene fluoride)-Based 4-Miktoarm Star Terpolymer: Synthesis and Self-Assembly" Patil Y.; Bilalis P.; Polymeropoulos G.; Almahdali S.; Hadjichristidis N.; and Rodionov V.O. *Mol. Pharmaceutics.* 2018, **15**, 3005-3009

Book Chapters

1. Mugemana C.; Almahdali S.; and Rodionov, V. O. "Sequence-Controlled Polymerization Guided by Aryl-Fluoroaryl π -Stacking." in *Sequence-Controlled Polymers: Synthesis, Self-Assembly, and Properties (ACS Symposium Series)*, pp. 235-253, DOI: 10.1021/bk-2014-1170.ch016

Patents and Patent Applications

1. Finn, M. G.; Rodionov, V. O. "Preparation of ligands for copper-catalyzed azide-alkyne cycloaddition reactions." US 20100197871 A1, **2009**, 55pp.
2. Rodionov, V.O.; Khanh, V.B. "Surface functionalized hollow silica particles and composites" WO 2017/085544 A1, **2017**, 38pp.

Competitive Funding

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| 1. KAUST OCRF "Catalysis with Soft Materials" | 2012-2015 |
| \$587K (out of \$1.1M) (Primary Investigator) | |
| 2. KAUST OCRF: "Design and Engineering of Photocatalytic Material Structures for Solar Hydrogen" | 2012-2015 |
| \$250K (out of \$3.5M) (Co-PI) | |
| 3. KAUST Seed Fund "Lightweight Nanocomposites for Aerospace and Energy Applications" | 2014-2015 |
| \$140K (Primary Investigator) | |

KAUST OCRF grant program is administered by KAUST, but employs independent external reviewers to evaluate the proposals using the same methodology as the major US funding agencies. The application process is highly competitive.

Awards and Recognition

ISSEP (Soros Foundation) Undergraduate Student Fellowship, 1997-1998
ACS Division of Organic Chemistry Graduate Student Fellowship (sponsored by Boehringer Ingelheim), 2005-2006