Curriculum Vitae, Dr. Vadym Mochalin

Dr. Vadym Mochalin,
Associate Professor,
Department of Chemistry,
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Languages: English (fluent), Russian (native), Ukrainian (native).

h-index: 47 ***i10-index: 76*** ***Citations per year 3292 (2021)***

Education

Ph.D., Physical chemistry July 2001
Institute of Physical Organic and Coal Chemistry, National Academy of Sciences of Ukraine, Donetsk, Ukraine
Thesis: "Thermodynamics of Solubility of Non-Electrolytes in the Water - Acetic Acid and Water - Sulfuric Acid Systems".
Professor A. I. Lutsyk, Department of Electrophilic Reactions, advisor.

B.S./M.S., Biochemistry (*cum laude*) June 1993
Donetsk National University, Donetsk, Ukraine
Thesis: "Solubility of Hydrocarbons in the Water - Acetic Acid System".
Professor N. T. Maleeva, Department of Biochemistry, advisor.

Professional experience

Associate Professor 8/2015 - Present
Department of Chemistry, Missouri University of Science and Technology, Rolla, Missouri.

Teaching classes in physical chemistry and supervising a group of four students and three post-docs. Research focus: materials for extreme environments, novel 2D materials (2D transition metal carbides/nitrides - MXenes), nanodiamond. Development and chemical modification of materials for energy storage, composites, and biomedical applications. Computational modeling of materials.

Associate Research Professor 6/2012 – 8/2015
Department of Materials Science and Engineering, Drexel University and A. J. Drexel Nanomaterials Institute, Philadelphia, Pennsylvania.

Teaching classes and supervising a group of five students and one post-doc. Current primary research focus is in synthesis, characterization, and modification of novel 2D materials (MXene) and nanodiamond for energy storage and biomedical applications. Nanodiamond is one of the most promising materials for design of theranostic platforms. Particularly, nanodiamond is researched for drug delivery across the brain blood barrier, imaging, and diagnosis of brain tumors and neurogenerative diseases. MXene is a new large family of 2D transition metal carbides and nitrides, dramatically extending the world of 2D materials beyond graphene.

Assistant Research Professor 8/2009 - 5/2012
Department of Materials Science and Engineering, Drexel University and A. J. Drexel Nanomaterials Institute, Philadelphia, Pennsylvania.

Taught classes and supervised a group of four students. Developed nanodiamond-polymer composites for biomedical and structural applications, biodegradable nanodiamond poly-(l-lactic acid) composites for tissue engineering and bone surgery. Designed carbon nanoonions for high power supercapacitors and other energy storage applications. Performed atomistic molecular dynamics studies of nanodiamond transformation into carbon nanoonions.

Co-founder, NanoWound Devices, Inc. 11/2011

Senior Research Associate 9/2007 - 7/2009
A. J. Drexel Nanomaterials Institute, Philadelphia, Pennsylvania.

Served as lab and safety supervisor for nanomaterials group. Developed gas and wet chemistry techniques for surface modification of nanodiamond for polymer and metal matrix composites. Synthesized first bright blue luminescent nanodiamond. Developed a modified phonon confinement model and clarified the role of functional groups in Raman spectroscopy of nanodiamond.

Postdoctoral Researcher 2/2005 - 8/2007
A. J. Drexel Nanomaterials Institute, Philadelphia, Pennsylvania.

Developed a set of new techniques for purification and surface modification of nanodiamond. Characterized nanodiamonds of different origin, purity, and after various surface modifications. Developed and optimized large scale air oxidation for purification of detonation nanodiamond.

Researcher 7/2001 - 1/2005
L. M. Litvinenko Institute of Physical-Organic and Coal Chemistry, National Academy of Sciences of Ukraine, Donetsk, Ukraine.

Synthesized and characterized graphene nanoscrolls for advanced energy storage systems and sorption. Developed floating adsorbents and photocatalysts from exfoliated graphite and nanocrystalline TiO_2 for wastewater treatment and environment decontamination.

Software developer 7/2001 - 1/2005
L. M. Litvinenko Institute of Physical-Organic and Coal Chemistry, National Academy of Sciences of Ukraine, Donetsk, Ukraine.

Designed and programmed (using Microsoft Visual C++) software for communication, data collection and processing for a custom-made thermogravivolumetric analysis instrument used in studies of graphite intercalation and exfoliation. Designed and implemented (using Microsoft Visual C++, ODBC and Microsoft Access) client-server multiuser information management system for the Institute.

Field of research

- Nanomaterials: synthesis, characterization, purification, chemical functionalization, and surface modification for biomedical, electronic, composite, and energy applications
- Theranostic platforms and drug delivery for ocular, anticancer, and neurological applications
- New two-dimensional materials (graphene nanoscrolls, 2D carbides and nitrides - MXene): synthesis, characterization, chemical modification, modeling, and applications for energy storage, catalysis, and composites
- Nanodiamond-reinforced polymer composites for structural, energy, and thermal management applications
- Biodegradable nanocomposites for tissue engineering and surgery
- Computational modeling of materials

Teaching

- Classes taught in the Department of Chemistry at Missouri S&T (2015-2021):
    - Undergraduate class (20-28 students) “Introduction into Quantum Chemistry and Spectroscopy” CHEM3420/5420 (Fall 2015, Spring 2017-2021)
    - Undergraduate class (~25 students) “Chemical Kinetics I” CHEM 3430 (Fall 2019-2020)
    - Undergraduate class (~200 students) “General Chemistry Lab” CHEM1319 (Fall 2016-2018)

- Classes taught in the Department of Materials Science & Engineering at Drexel University (2010-2015):
    - Graduate class (25 students) "Experimental Techniques in Materials" (MATE 515) in Fall 2014. The class covers theory of modern experimental techniques in materials science and engineering, including microscopy, X-Ray and neutron diffraction, spectroscopy, mechanical testing, thermal analysis, etc.
    - Undergraduate class (20+ students) "Advanced Materials Lab" (MATE 280) in Fall 2008, Fall 2010-2013. The class covers theory and gives students first-hand experience in modern materials characterization techniques, including spectroscopy, diffraction, microscopy, mechanical testing, particle size and surface analysis, etc.
- Mentored more than 10 students and post-docs at Missouri S&T. Two of them are OURE and FYRE students, one of whom won several University and National awards in Chemistry (2015-2018)
- Supervise a group of 5-7 undergraduate, graduate, post-doctoral, and visiting researchers per year, working on chemistry and physics of nanodiamond, nanoonions, MXenes, and other materials

Ph.D. and M.S. Thesis advisor/co-advisor

2016-2021 Shuohan Huang (Ph.D., Chemistry, Missouri S&T), "Synthesis, Characterization and Chemistry of Two-Dimensional Transition Metal Carbides and Nitrides (Mxenes)".

2016-2020 Ibrahim Abdullahi (M.S., Chemistry, Missouri S&T), "Nanodiamonds and Carbon Nano-Onions Ceramic Composites and Their Applications".

2015-2017 Svetlana Leonidovna Mikhailova (Ph.D, Physics), "Structure and electronic properties of the amorphous diamond-like carbon films of (a-C:H), modified by metal nanoclusters", Department of Physics, al-Farabi Kazakh National University (Foreign Advisor).

2008-2012 Ioannis Neitzel (Ph.D.), "Nanodiamond-Polymer Composites", Materials Science & Engineering, Drexel University (Co-Advisor).

Recent honors and awards

04/2021 **Certificate in Effective College Instruction** from the Association of College and University Educators and the American Council on Education (https://lms.acue.org/RoC/award_pdf.php?id=VmFkeW0rTW9jaGFsaW4lMkYxNjE4OTc1MTk2&uid=20638&cid=1221)

11/2020 **The 2020 Missouri S&T Faculty Research Award** in recognition of excellence in research and scholarship (https://news.mst.edu/2020/11/missouri-st-faculty-honored-for-excellence-in-teaching-research-and-service-2/)

02/2018 **One of the six Nanotechnology Highlights of 2017 in Topical Reviews** K. Turcheniuk and V. N Mochalin "Biomedical applications of nanodiamond", **Nanotechnology**, **28**, 252001 (2017) (http://iopscience.iop.org/journal/0957-4484/page/Highlights%202017)

09/2016 **One of the top 10 most often downloaded papers** V. N. Mochalin, O. Shenderova, D. Ho, Y. Gogotsi *"The Properties and Applications of Nanodiamonds"*, **Nature Nanotechnology**, **7** (1), p.11-23 (2012) (http://www.nature.com/nnano/topten/index.html)

09/2014 **Best Poster Award** (*P-15 Two-Dimensional Transition Metal Carbides for Energy Storage Application, O. Mashtalir, M. Naguib, V. N. Mochalin, et al.*) at the 6th PCGMR-NCKU Symposium Nanotechnology/Materials for Future Devices, BioMedical Applications, Taiwan (https://sites.google.com/site/6thpcgmr/home)

05/2014 Quoted and asked to comment about the work of others at **PhysicsWorld** (http://physicsworld.com/cws/article/news/2014/may/28/structural-supercapacitors-take-a-load-on)

02/2014 **Inside Front Cover Image** "*MXenes: A New Family of Two-Dimensional Materials"*, **Advanced Materials, 26,** 7 February (2014) (http://onlinelibrary.wiley.com/doi/10.1002/adma.201470041/abstract)

Professional memberships

- American Chemical Society (ACS), 2008 – present
- Materials Research Society (MRS), 2008 – present
- American Physical Society (APS), 2017 – present
- American Ceramic Society (ACerS), 2019 – present

Editor/editorial board member

- Editor of Diamond & Related Materials (Elsevier), 2021 – present
- Editorial Board Member of Scientific Reports (Nature Publishing Group) 2012 – present

Reviewer/Referee

- **Journals:** Science, Nature Communications, Scientific Reports, Journal of the American Chemical Society, Angewandte Chemie, Advanced Materials, Advanced Functional Materials, Advanced Energy Materials, Chemical Communications, Applied Physics Letters, ACS Nano, Langmuir, Journal of Materials Chemistry A, Journal of Materials Chemistry B, The Journal of Physical Chemistry, Journal of Materials Chemistry, Journal of Chemical Information and Modeling, Chemistry - A European Journal, Chemical Physics Letters, Diamond and Related Materials, Nanotechnology, Carbon, Journal of Electro-Analytical Chemistry, Journal of Vacuum Science and Technology B, Colloids and Surfaces A, etc.
- **Funding agencies:** National Science Foundation, USA; National Science Centre (Narodowe Centrum Nauki), Poland; Czech Science Foundation, Czech Republic; Ministry of Education and Science of the Russian Federation, «Mega-grants Program»; United States-Israel Binational Science Foundation (BSF); Russia-Israel Scientific Research Cooperation; Israeli Ministry of Science; ACS Petroleum Research Fund, USA; Natural Sciences and Engineering Research Council of Canada

Conference/symposium organizer and session chair

- Lead Symposium Organizer, 2021 Beilstein Nanotechnology Symposium on Nanodiamonds, March 2021, Mainz, Germany (postponed due to COVID)
- Conference Committee Member, 31th International Conference on Diamond and Carbon Materials (sponsored by Elsevier), 6 - 9 September 2021, Zoom, Internet
- Conference Committee Member, 30th International Conference on Diamond and Carbon Materials (sponsored by Elsevier), 8 - 12 September 2019, Melia Lebreros, Seville, Spain
- Symposium Organizer (Symposium NM06: Nanodiamonds - Synthesis, Characterization, Surface Chemistry and Applications), 2018 MRS Spring Meeting and Exhibit, 2018, Phoenix, Arizona
- Program Committee Member, New Diamond and Nano Carbons Conference, 2018, Flagstaff, Arizona
- Conference Committee Member, 29th International Conference on Diamond and Carbon Materials (sponsored by Elsevier), September 2-6, 2018, Dubrovnik, Croatia

- Conference Committee Member, 28th International Conference on Diamond and Carbon Materials (sponsored by Elsevier), September 3-7, 2017, Gothenburg, Sweden
- Lead Symposium Organizer (Symposium NT-5: Nanodiamonds - Fundamentals and Applications), 2016 MRS Spring Meeting and Exhibit, March 28 - April 1, 2016, Phoenix, Arizona
- Symposium Organizer (Symposium PP: Nanodiamonds - Fundamentals and Applications), 2014 MRS Spring Meeting and Exhibit, April 21-25, 2014, San Francisco, California
- Session Chair (Oral Session 26: Nanodiamond 2), Elsevier International Conference on Diamond and Carbon Materials, September 2-5, 2013, Riva del Garda, Italy
- Session Chair (Session FF4: Biomedical Applications of Nanodiamond Particles, Symposium FF: Nanodiamond Particles and Related Materials - From Basic Science to Applications), 2012 MRS Spring Meeting and Exhibit, April 9-13, 2012, San Francisco, California
- Session Chair, NanoDiamond'2008, 1-4 July, 2008, St. Petersburg, Russia

Departmental, college, and campus service

2016	member of Faculty Search Committee (for Enabling Materials for Extreme Environments and Advanced Materials; for Sustainable Infrastructure signature areas)
2017-2020	Ph.D. Defense Committee Member: Chemistry (Siddesh Umaphati defended Jan 2020, Ming Huang defended May 2019, Luo Bin current, Meenakshi Sharma current); Materials Science & Engineering (Evan Schwind current)
2018	member of Graduate Affairs Committee (Chemistry)
2017-2019	member of Academic Freedom and Standards Committee (Missouri S&T)
2015,2020-	member of Graduate Recruitment Committee (Chemistry)
2020-	member of Missouri S&T Information Technology/Computing Committee

Unsolicited coverage in media

http://www.sciencedaily.com
http://www.newswise.com
https://www.nanowerk.com
http://www.phelpscountyfocus.com
http://www.therolladailynews.com
https://smartwatermagazine.com
https://www.nanowerk.com/nanotechnology
http://phys.org/news/2015
http://www.naturetimes.com
http://www.iom3.org/
http://www.publicnow.com
https://www.naturalnews.com
https://phys.org/news/2020
etc.

Grants awarded

15. September 1, 2019 - August 31, 2022: **National Science Foundation** Award # 1930881 *"Atomic-Layer Dependent Adhesion of Two-Dimensional Transitional Metal Carbides (MXenes)"* $407,962 (**Co-PI**)
14. August 1, 2019 - July 31, 2022: **National Institute of Health National Eye Institute** Award #0058619 *"Enhancing ocular uptake of thiol antioxidants with nanodiamonds"* $387,500 (**Co-PI**)
13. July 1, 2019 - June 31, 2021: **Missouri S&T Office of Research** *"New Biomedical Research Core Facility: The Bio-CURE Lab at Missouri S&T"* $400,000 (**Co-PI**)
12. October 1, 2018 - September 30, 2021: **DAICEL Corp. (Japan)** *"Characterization, purification, chemical modification and development of nanodiamond particles (ND) for ND-polymer composites"* $210,120 (**PI**)

11. June 15, 2018 - June 14, 2021: **Army Research Office** Award # 0055437 *"Detonation Synthesis of Nanomaterials"* $381,000 (**Co-PI**)
10. October 21, 2016 - September 30, 2018: **DAICEL Corp. (Japan)** *"Characterization, purification, chemical modification of nanodiamond particles (ND) for improved dispersion in aqueous and non-aqueous systems, and subsequent development, manufacturing, and testing of ND based composites"* $200,133 (**PI**)
9. November 1, 2015 - July 31, 2016: **US Army Research Laboratory** Proposal #W911NF-17-1-0001 *"Detonation Synthesis of Nanomaterials"* $50,000 (**Co-PI**)
8. January 16, 2015 - June 30, 2015: **National Science Foundation** RAPID Proposal #1518999 *"Hierarchical Carbon Adsorbent for Cytokines Removal from Blood of the Ebola Virus Disease Patients"* $100,000 (**PI**)
7. June 2012: Drexel - Shanghai Advanced Research Institute Center "*Nanodiamond Platforms for Anticancer Chemotherapeutics Delivery in Brain*" $117,000 (FY2013) (**Co-PI**)
6. July 1, 2010: **NSF** proposal #CBET-0959361 *"MRI-R2: Acquisition of an X-ray Photoelectron Spectroscopy (XPS) Surface Analysis Instrumentation for Enabling Research and Education in Greater Philadelphia"* $1,125,000 (**Co-PI**)
5. August, 2009 - July, 2012: **NSF** Proposal #0927963 *"GOALI/Collaborative Research: Functionalized Nanodiamond Reinforced Biopolymers for Microporous Surgical Fixation Devices."* $568,090 (**Co-PI**)
4. October 1, 2007 - June 30, 2008 Proof of Concept Fund by Nanotechnology Institute / Ben Franklin Technology Partners of Southeastern Pennsylvania *"Incorporation of Functionalized Nanodiamond into the Polymeric Structure of Epoxy Systems"* (**Project Leader**)
3. December 1, 2006 - June 30, 2007: Nanotechnology Applications Fund by Nanotechnology Institute / Ben Franklin Technology Partners of Southeastern Pennsylvania *"Nanodiamond for Drug Delivery, Biomedical Imaging and Decreasing Blood Cholesterol"* (**Project Leader**)
2. May 1, 2005 - December 31, 2005: Nanotechnology Applications Fund R&D Proposal by Nanotechnology Institute / Ben Franklin Technology Partners of Southeastern Pennsylvania "*Surface Modification of Nanodiamond for Biomedical Applications*" (**Project Leader**)
1. September 2005 - May 2006: Ben Franklin Technology Partners of Southeastern Pennsylvania "*Surface Modification of Nanodiamond*" (**Project Leader**)

User facilities and other grants awarded

5. April 26, 2019 Argonne National Laboratory, Center for Nanoscale Materials, proposal # CNM 64421 *"Tribology of 2D Transition Metal Carbides (MXenes)"* (**PI**)
4. January 7, 2015: Oak Ridge National Laboratory, Neutron Sciences, Neutron Sciences, Fine-Resolution Fermi Chopper Spectrometer (SEQUOIA), proposal # IPTS-12866.1 *"Combined Inelastic Neutron Scattering and Theoretical Study of Vibrational Density of States of MXenes"* (**PI**)
3. November 12, 2012: Oak Ridge National Laboratory, Neutron Sciences, Extended Q-Range Small-Angle Neutron Scattering (EQSANS), proposal # IPTS-8350 *"Structure Determination of Intercalated MXene"* (**PI**)
2. November 12, 2012: Oak Ridge National Laboratory, Neutron Sciences, Fine-Resolution Fermi Chopper Spectrometer (SEQUOIA), proposal # IPTS-8289 *"Study of MXene and MXene Intercalation Compounds by Inelasting Neutron Scattering"* (**PI**)
1. April 29, 2011: Oak Ridge National Laboratory, Neutron Sciences, Fine-Resolution Fermi Chopper Spectrometer (SEQUOIA), proposal #IPTS-4917 *"Neutron Spectroscopy of Nanodiamonds"* (**PI**)

Written and submitted proposals (two additional proposals currently in preparation)

12. NSF Proposal "Understanding Chemistry of 2D Transition Metal Carbides/Nitrides (MXenes) for Rational Development of Applications" 456,350 (**PI**) (*submitted 2021*)
11. NIH Proposal "National Facility for the Production of Biomedical Nanoradioisotopes" $8,000,000 (*submitted, 2020*)
10. NSF Proposal "Understanding Deformation and Failure Mechanisms of Two-Dimensional (2D) Mono-M MXenes" $416,516 (**Co-PI**) (*declined*)
9. Missouri Soybean Merchandising Council Proposal "Soybean Hull and Straw Derived Adsorbents for Removal of Uremic Toxins and Cytokines by Extracorporeal Hemoperfusion" $125,733(**PI**) (*declined*)
8. DoD SBIR Proposal "Metal Composite Flakes Containing Novel 2D Materials for Advanced Obscuration" $40,666 (Phase I) (**PI**) (*declined*)
7. Department of Energy Basic Energy Sciences Proposal "Compositional Control of Fundamental Electronic, Vibrational and Magnetic Properties of Ordered Layered Multi-elemental MXenes" (**Co-PI**) (*declined*)
6. National Science Foundation STTR Proposal "Epoxy Reinforcement by Modified Single Digit Nanodiamond Particles for Polymer Matrix Composites" $135,000 (Phase I) (**PI**) (*declined*)
5. Wallace H. Coulter Translational Partners Grant Program "Nanodiamond for Sustained Localized Delivery of Vancomycin in Diabetic Osteomyelitis" $100,000 (1st year) (**PI**) (*declined*)
4. National Science Foundation Proposal "GOALI: Carbon Nanoparticle Oil Tribology", $1,000,000 (**Co-PI**) (*declined*)
3. National Science Foundation Proposal "Adsorption of Drugs on Nanodiamond: Towards Development of a Theranostic Platform", $450,000 (**Co-PI**) (*declined*)
2. Office of Naval Research Proposal "Nanodiamond-Enhanced Polymer Matrix Composites for Advanced Structural and Coating Applications in Sea-Based Aircraft" $600,000 (**PI**) (*declined*)
1. Oak Ridge National Laboratory, Neutron Sciences, Quasi-Elastic Neutron Scattering (QENS) user proposal "Dynamics of Intercalant in Intercalated MXene" (**PI**) (*declined*)

Peer reviewed journal publications (submitted, accepted or published; three additional papers currently in preparation)

92. *A. Rosenkranz, M. C. Righi, A. V. Sumant, B. Anasori, V. N. Mochalin Perspectives of 2D MXene Tribology,* ***Advanced Materials*** *(2022 in press, manuscript ID adma.202207757) (perspective article)*
91. S. Huang, V. Natu, J. Tao, Y. Xia, V. N. Mochalin, M. W. Barsoum, *Understanding the Effect of Sodium Polyphosphate on Improving Chemical Stability of $Ti_3C_2T_z$ MXene in Water*, **Journal of Materials Chemistry A** (2022 published online, DOI: 10.1039/D2TA04009C)
90. S. Huang, V. N. Mochalin *Combination of High pH and an Antioxidant Improves Chemical Stability of Two-Dimensional Transition-Metal Carbides and Carbonitrides (MXenes) in Aqueous Colloidal Solutions*, **Inorganic Chemistry**, **61** (26), p. 9877-9887 (2022) (https://www.azonano.com/news.aspx?newsID=39308)
89. S. L. Y. Chang, P. Reineck, A. Krueger, V. N. Mochalin *Utrasmall Nanodiamonds: Perspectives and Questions*, **ACS Nano**, **16** (6), p. 8513-8524 (2022) (perspective article)
88. Y. Li, S. Huang, C. Wei, D. Zhou, B. Li, V. N. Mochalin, C. Wu *Friction Between MXenes and Other Two-Dimensional Materials at the Nanoscale*, **Carbon**, **196**, p. 774-782 (2022)
87. Y. Li, C. Wei, S. Huang, A. Ghasemi, W. Gao, C. Wu, V. N. Mochalin *In Situ Tensile Testing of Nanometer-Thick Two-Dimensional Transition-Metal Carbide Films: Implications for MXenes Acting as Nanoscale Reinforcement Agents*, **ACS Applied Nanomaterials**, **4** (5), p. 5058-5067 (2021)

86. S. Huang, K. Mutyala, A. Sumant, V. N. Mochalin *Achieving Superlubricity with 2D Transition Metal Carbides (MXenes) and MXene/Graphene Coatings*, **Materials Today Advances**, **9**, Article # 100133 (2021)
85. Y. Li, S. Huang, C. Wei, D. Zhou, B. Li, C. Wu, V. N. Mochalin *Adhesion Between MXenes and Other 2D Materials*, **ACS Applied Materials & Interfaces**, **13** (3), p. 4682-4691 (2021)
84. Y. Li, C. Wei, S. Huang, C. Wu, V. N. Mochalin *In-situ SEM compression of accordion-like multilayer MXenes*, **Extreme Mechanics Letters**, **41**, Article # 101054 (2020)
83. S. Huang, V. N. Mochalin *Understanding Chemistry of Two-Dimensional Transition Metal Carbides and Carbonitrides (MXenes) with Gas Analysis*, **ACS Nano**, **14** (8), p. 10251-10257 (2020) (covered at https://www.nanowerk.com/nanotechnology-news2/newsid=55699.php)
82. J. Yi, J. Li, S. Huang, L. Hu, L. Miao, C. Zhao, S. Wen, V. N. Mochalin, A. M. Rao Ti_2CT_x *MXene-based all-optical modulator*, **InfoMat**, **2** (3), p.601-609 (2020)
81. I. M. Abdullahi, M. Langenderfer, O. Shenderova, N. Nunn, M. D. Torelli, C. Johnson, V. N. Mochalin *Explosive Fragmentation of Luminescent Diamond Particles*, **Carbon**, **164**, p. 442-450 (2020)
80. M. J. Langenderfer, W. G. Fahrenholtz, S. Chertopalov, Y. Zhou, V. N. Mochalin, C. E. Johnson *Detonation Synthesis of Silicon Carbide Nanoparticles*, **Ceramics International**, **46** (5), p.6951-6954 (2020)
79. G. Thalassinos, A. Stacey, N. Dontschuk, B. J. Murdoch, E. Mayes, H. A. Girard, I. M. Abdullahi, L. Thomsen, A. Tadich, J.-C. Arnault, V. N. Mochalin, B. C. Gibson, P. Reineck *Fluorescence and Physico-Chemical Properties of Hydrogenated Detonation Nanodiamonds*, **C-Journal of Carbon Research**, **6** (1), Article # 7 (2020)
78. A. Kume, V. N. Mochalin S*onication-Assisted Hydrolysis of Ozone Oxidized Detonation Nanodiamond*, **Diamond and Related Materials**, **103**, Article # 107705 (2020)
77. G. Li, N. Amer, H. A. Hafez, S. Huang, D. Turchinovich, V. N. Mochalin, F. A. Hegmann, L. V. Titova *Dynamical Control over Terahertz Electromagnetic Interference Shielding with 2D $Ti_3C_2T_y$ MXene by Ultrafast Optical Pulses*, **Nano Letters**, **20** (1), p.636-643 (2019)
76. J. Beltz, A. Pfaff, I. M. Abdullahi, A. Cristea, V. N. Mochalin, N. Ercal *Effect of Nanodiamond Surface Chemistry on Adsorption and Release of Tiopronin*, **Diamond and Related Materials**, **100**, Article # 10759 (2019)
75. J. Yi, L. Du, J. Li, L. Yang, L. Hu, S. Huang, Y. Dong, L. Miao, S. Wen, V. N. Mochalin, C. Zhao, A. M. Rao *Unleashing the Potential of Ti_2CT_x MXene as a Pulse Modulator for Mid-Infrared Fiber Lasers*, **2D Materials**, **6** (4), Article # 045038 (2019)
74. Y. Li, S. Huang, C. Wei, C. Wu, V. N. Mochalin *Adhesion of Two-Dimensional Titanium Carbides (MXenes) and Graphene to Silicon*, **Nature Communications**, **10** (1), Article # 3014 (2019)
73. S. Huang, V. N. Mochalin *Hydrolysis of 2D Transition-Metal Carbides (MXenes) in Colloidal Solutions* **Inorganic Chemistry**, **58** (3), p.1958-1966 (2019) (cited 114 times https://scholar.google.com/scholar?oi=bibs&hl=en&cites=4505563154437259499, covered at https://phys.org/news/2019-01-d-transition-metal-carbides-react.html)
72. V Borysiuk, V. N. Mochalin *Thermal Stability of Two-Dimensional Titanium Carbides Tin+1Cn (MXenes) from Classical Molecular Dynamics Simulations*, **MRS Communications**, **9** (1), p.203-208 (2019)
71. M. Seredych, B. Haines, V. Sokolova, P. Cheung, F. Meng, L. Stone, L. Mikhalovska, S. Mikhalovsky, V. N. Mochalin, Y. Gogotsi *Graphene-Based Materials for the Fast Removal of Cytokines from Blood Plasma,* **ACS Applied Bio Materials**, **1** (2), p.436-443 (2018)
70. G. Li, K. Kushnir, Y. Dong, S. Chertopalov, A.M. Rao, V. Mochalin, R. Podila, L. Titova *Equilibrium and Non-Equilibrium Free Carrier Dynamics in Two-Dimensional $Ti_3C_2T_x$ MXenes: THz spectroscopy study,* **2D Materials**, **5** (3), Article # 035043 (2018)

69. S. Chertopalov, V. N. Mochalin *Environment Sensitive Photoresponse of Spontaneously Partially Oxidized $Ti_3C_2T_x$ MXene Thin Films,* **ACS Nano**, **12** (6), p.6109-6116 (2018) (cited 103 times https://scholar.google.com/scholar?oi=bibs&hl=en&cites=2466230494559114087, covered at https://www.azonano.com/news.aspx?newsID=36225)
68. Y. Zheng, N. Pescatore, Y. Gogotsi, B. Dyatkin, G. Ingavle, V. Mochalin, T. Ozulumba, S. Mikhalovsky, S. Sandeman *Rapid Adsorption of Pro-inflammatory Cytokines by Graphene Nanoplatelets and Their Composites for Extracorporeal Detoxification,* **Journal of Nanomaterials**, Article ID 6274072, 8 pages (2018)
67. Y. Dong, S. Chertopalov, K. Maleski, B. Anasori, L. Hu, S. Bhattacharya, A. M. Rao, Y. Gogotsi, V. N. Mochalin, R. Podila *Saturable Absorption in 2D Ti_3C_2 MXene Thin Films for Passive Photonic Diodes,* **Advanced Materials,** 1705714, https://doi.org/10.1002/adma.201705714 (2018)
66. Y. Dong, S. S. K. Mallineni, K. Maleski, H. Behlow, V. N. Mochalin, A. M. Rao, Y. Gogotsi, R. Podila *Metallic MXenes: A New Family of Materials for Flexible Triboelectric Nanogenerators,* **Nano Energy**, **44**, p.103-110 (2018)
65. V. N. Borysiuk, V. N. Mochalin, Y. Gogotsi *Bending Rigidity of Two-Dimensional Titanium Carbide (MXene) Nanoribbons: A Molecular Dynamics Study*, **Computational Materials Science**, **143**, p.418-424 (2018)
64. P. Reineck, D. W. M. Lau, E. R. Wilson, K. Fox, M. R. Field, C. Deeleepojananan, V. N. Mochalin, B. C. Gibson *Effect of Surface Chemistry on the Fluorescence of Detonation Nanodiamonds*, **ACS Nano**, **11** (11), p.10924-10934 (2017)
63. K. Turcheniuk, V. N. Mochalin *Biomedical Applications of Nanodiamond (Review)*, **Nanotechnology**, **28** (25), article #252001 (27pp) (2017) (highlighted topical review http://iopscience.iop.org/journal/0957-4484/page/Highlights%202017, cited 201 times)
62. K. Maleski, V. N. Mochalin, Y. Gogotsi *Dispersions of Two-Dimensional Titanium Carbide MXene in Organic Solvents*, **Chemistry of Materials**, **29** (4), p.1632-1640 (2017)
61. M. Ghidiu, S. Kota, J. Halim, A. W. Sherwood, N. Nedfors, J. Rosen, V. N. Mochalin, M. W. Barsoum *Alkylammonium Cation Intercalation into Ti_3C_2 (MXene): Effects on Properties and Ion-Exchange Capacity Estimation*, **Chemistry of Materials**, **29** (3), p.1099-1106 (2017)
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Patents

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Talks, seminars, and conference presentations

72. V. N. Mochalin *MXene Chemistry: Fundamentals and Applications* (**Invited Talk**), MXene – Addressing Global Challenges with Innovation – 2nd International Conference at Drexel University, 1-3 Aug 2022, Philadelphia, PA, USA (https://mxeneconference.coe.drexel.edu/speakers-panelists/)
71. V. N. Mochalin *MXene Chemistry: Fundamentals and Applications* (**Invited Talk**), 15th International Ceramics Congress (CIMTEC), 20-24 Jun 2022, Perugia, Italy (http://2022.cimtec-congress.org/)
70. V. N. Mochalin *Chemistry of 2D Transition Metal Carbides and Nitrides (MXenes)* (**Invited Talk**), 2022 Materials Research Society Spring Meeting, 8-13 May 2022, Honolulu, Hawaii, USA ()
69. V. N. Mochalin *Chemistry of Transition Metal Carbides: from Bulk to* Nanoscale (**Invited Talk**), 31st International Conference on Diamond and Carbon Materials, 6-9 Sep 2021, online: live and on-demand (https://www.elsevier.com/events/conferences/international-conference-on-diamond-and-carbon-materials/programme/speakers)
68. V. N. Mochalin *2,1,0… Chemist's Adventures in Nanomaterials Wonderland* (**Invited Talk**) 2021 Fall American Chemical Society Meeting, 22-26 Aug-2021 Atlanta, GA, USA
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65. V. N. Mochalin *Progress in Nanodiamonds for Novel Composites and Biomedical Applications* (**Invited Lecture**), Virtual Lecture Series on Nanodiamond, 28 May 2020, https://www.adamasnano.com/virtual-lecture-series-on-nanodiamond/
64. V. N. Mochalin *MXene Chemistry: Fundamentals and Applications* (**Invited Talk**), 2020 Materials Research Society Spring Meeting, 13-17 Apr 2020, Phoenix, AR, USA (conference cancelled due to COVID-19 pandemic)
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61. V. N. Mochalin *2D Transition Metal Carbides (MXenes): Synthesis, Properties, and Applications* (**Invited Seminar**), Institute of Physics of the Czech Academy of Sciences, 16 Jan 2020, Prague, Czech Republic (https://www.fzu.cz/en/oddeleni/2d-transition-metal-carbides-mxenes-synthesis-properties-and-applications)
60. V. N. Mochalin *MXenes* (**Invited Talk**), MXene at the Frontier of the 2D Materials World Beilstein Nanotechnology Symposium, 15 Oct – 17 Oct, 2019, Mainz, Germany
59. V. N. Mochalin *Nanodiamond and 2D Transition Metal Carbides (MXenes): Chemistry and Applications* (**Invited Seminar**), Universität Würzburg, Institut für Organische Chemie, 14 Oct, 2019, Würzburg, Germany (https://www.chemie.uni-wuerzburg.de/en/oc/about/lectures-seminars-

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54. V. N. Mochalin, C. Deeleepojananan, I. Abdullahi *De-Aggregation and Control of Surface Chemistry of Nanodiamond for Biomedical Applications* (**Invited Talk**), 2018 European Materials Research Society Spring Meeting, 18-22 Jun 2018, Strasbourg, France
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49. V. Mochalin *MXenes for Energy Generation and Optical Applications* (**Invited Talk**), Nanotechnology and Nanomaterials (NANO-2017) at Y. Fedkovych National University, 23-26 Aug 2017, Chernivtsi, Ukraine
48. V. Mochalin *Nanodiamond and MXenes – Nanomaterials for Composites, Biomedical, and Energy Applications* (**Invited Lecture**), 4th International Summer School Nanotechnology: from fundamental research to innovations, 19-22 Aug 2017, Migovo, Ukraine
47. V. Mochalin *Detonation Nanodiamond: Synthesis, Deaggregation, Modification, Applications*, 20th Biennial Conference of the APS Topical Group on Shock Compression of Condensed Matter, 9-14 Jul 2017 St Louis, MO, USA
46. V. N. Mochalin, Y. Gogotsi *Biomedical Applications of Diamond Nanoparticles* (**Invited Talk**), 227th Electrochemical Society Meeting, 24 - 28 May 2015, Chicago, IL, USA
45. V. N. Mochalin *Onion-Like Nanocarbons and MXenes for Electrochemical Energy Storage Applications* (**Invited Lecture**), 16th Topical Meeting of the International Society of Electrochemistry, 22-26 Mar 2015, Angra dos Reis, Brazil
44. V. N. Mochalin *2,1,0: Chemist's Adventures in Nanomaterials Wonderland* (**Invited Seminar**), Missouri University of Science and Technology, 3 Feb 2015, Rolla, Missouri
43. V. N. Mochalin *Novel Nanomaterials for Energy and Biomedical Applications* (**Invited Seminar**), Ulsan National Institute of Science and Technology, 27 Aug 2014, Ulsan, South Korea
42. V. N. Mochalin *Nanodiamond for Advanced Composites* (**Invited Talk**), Nanotech 2014, 15-19 Jun 2014, Washington, DC
41. V. N. Mochalin *Atomistic Modeling of Nanodiamond Solvation*, New Diamond and Nano Carbons, 25 - 29 May 2014, Chicago, IL
40. V. N. Mochalin, Y. Gogotsi *Modification of Nanodiamond for Improved Performance* (**Invited Talk**), New Diamond and Nano Carbons, 25 - 29 May 2014, Chicago, IL

39. V. N. Mochalin *Atomistic Modeling of Nanodiamond Solvation in Water*, Materials Research Society Meeting, 20 - 25 Apr 2014, San Francisco, CA, USA
38. V. N. Mochalin *Biomedical Applications of Diamond Nanoparticles: from Biodegradable Composites to Drug Delivery* (**Invited Seminar**), Temple University, 28 Feb 2014, Philadelphia, PA
37. V. N. Mochalin *MXene: A New Family of Two-Dimensional Materials* (**Invited Seminar**), Florida International University, 21 Feb 2014, Miami, FL
36. V. N. Mochalin *Characterization, Chemistry, and Applications of Nanodiamond* (**Invited Talk**), Schulich Workshop Physicochemical and Electronic Properties of Nanodiamond Films and Particles, Department of Chemistry, Technion (Israel Institute of Technology), 21 - 22 Jan 2014, Haifa, Israel
35. V. N. Mochalin *Novel Nanomaterials for Energy and Biomedical Applications* (**Invited Seminar**) Department of Materials Science and Engineering, Technion (Israel Institute of Technology), 16 Jan 2014, Haifa, Israel
34. V. N. Mochalin *Nanodiamond for Biomedical Applications and Advanced Composites* (**Invited Seminar**), Florida International University, 15 Nov 2013, Miami, FL
33. V. N. Mochalin *Nanodiamond for Biomedical Applications and Advanced Composites* (**Invited Lecture**), International Conference on Diamond and Carbon Materials 2013, 2 - 5 Sep 2013, Riva del Garda, Italy (**highlighted as #1 high profile speaker in the conference webcast**)
32. V. N. Mochalin *Nanodiamond Particles: Emerging Biomedical Applications* (**Invited Seminar**), Nanoscience Technology Center, University of Central Florida, 25 Apr 2013, Orlando, FL
31. V. N. Mochalin, A. Pentecost, Y. Gogotsi *Adsorption of Drugs on Nanodiamond: Towards Development of a Drug Delivery Platform*, Materials Research Society Meeting, 1 - 5 Apr 2013, San Francisco, CA, USA
30. V. N. Mochalin *Detonation Nanodiamond: Synthesis, Properties, and Applications,* Materials Research Society Meeting, 1 - 5 Apr 2013, San Francisco, CA, USA
29. V. N. Mochalin *Carbon Containing Nanomaterials for Energy, Composites and Biomedical Applications* (**Invited Seminar**), Carnegie Institution of Washington, Washington DC, 21 Nov 2012
28. I. Neitzel, B. Etzold, F. Strobl, V. Mochalin, Y. Gogotsi *Controlling Nanodiamond Surface Functionalization by a Layer-by-layer Approach*, International Conference on Diamond and Related Materials, 3 - 6 Sep 2012, Granada, Spain
27. I. Neitzel, V. Mochalin, A. Kontsos, G. Palmese, Y. Gogotsi *Nanodiamonds with Optimized Surface Chemistry for Polymer Composites*, International Conference on Diamond and Related Materials, 3 - 6 Sep 2012, Granada, Spain
26. V. N. Mochalin, I. Neitzel, Q. Zhang, A. Pentecost, M. Nelson, Y. Gogotsi *Surface Modification of Nanodiamond for Biomedical and Composite Applications*, 244th American Chemical Society Meeting, 19 - 23 Aug 2012, Philadelphia PA, USA
25. V. N. Mochalin, I. Neitzel, Y. Gogotsi *Covalent Incorporation of Nanodiamond into Epoxy Polymers*, 244th American Chemical Society Meeting, 19 - 23 Aug 2012, Philadelphia PA, USA
24. V. Mochalin *Nanodiamond and Carbon Nanoonions: Synthesis, Properties, and Interrelations* (**Invited Lecture**), Dalian University of Technology, 16 July 2012, Dalian, China (http://finechem.dlut.edu.cn/carbon/news/recent%20news/news20120716.html)
23. V. Mochalin *Advances in Nanodiamond for (Bio)Composite Applications* (**Invited Seminar**), Shanghai Jiao Tong Unversity, 10 July 2012, Shanghai, China
22. V. Mochalin *Surface modification of Nanodiamond for Biomedical and Composite Applications* (**Invited Seminar**), Shanghai Advanced Research Institute, Chinese Academy of Sciences, 6 July 2012, Shanghai, China
21. V. Mochalin, I. Neitzel *Advances in Nanodiamond for (Bio)Composite Applications* (**Invited Presentation**), 2012 MRS Spring Meeting, 9 - 13 Apr 2012, San Francisco CA, USA

20. V. Mochalin, I. Neitzel, Q. Zhang, J. Zhou, P. Lelkes, Y. Gogotsi *Nanodiamond for Advanced Polymer-Matrix Composites,* 2011 MRS Fall Meeting ,28 Nov - 2 Dec 2011, Boston MA, USA
19. V. Mochalin *Purification and Modification of Nanodiamond and Carbon Onions for Electrochemical Applications*, 220th Electrochemical Society Meeting, 9 - 14 Oct 2011, Boston, MA, USA
18. V. Mochalin *Nanodiamond - Material of the Future* (**Invited Seminar**) Alfred University, February 17-18 2011, NY
17. V. Mochalin *Nanodiamond: An Old and Unfamiliar Member of the Nanocarbons Family* (**Invited Seminar**) Ben-Gurion University of the Negev, 27 Apr 2010, Sde Boker, Israel
16. V. N. Mochalin, I. Neitzel, Q. Zhang, J. Zhou, C. A. Klug, Y. Gogotsi *Surface Functionalization of Nanodiamond for Composite and Biomedical Applications,* Materials Research Society Meeting, 29 Nov - 4 Dec 2009, Boston, MA, USA
15. V. Mochalin *Nanodiamond-Polymer Composites* (**Invited Lecture**) AATCC Symposium: Innovations in Functional Materials, Sports & Defense Technologies, & Composites Symposium & NTC Forum, 26 - 27 Oct 2009, Greenville, SC USA
14. V. Mochalin, I. Neitzel, Q. Zhang, A. Pentecost, I. Knoke, J. Zhou, Y. Gogotsi *Surface Modification of Nanodiamond for Biomedical Applications*, Nanobiophysics: Fundamental and Applied Aspects, 5 - 8 Oct 2009, B.Verkin Institute for Low Temperature Physics and Engineering of the NAS of Ukraine, Kharkov, Ukraine
13. V. Mochalin, J. Giammarco, A. Gurga, J. Detweiler, C. Hobson, Y. Gogotsi, M. Sullivan, A. Peterson, G. Palmese *Aminated Nanodiamond Powder as a Novel Material for Advanced Composites*, 236th American Chemical Society National Meeting, 17 - 23 Aug 2008, Philadelphia, PA USA
12. A. Stravato, K. Behler, V. Mochalin, G. Korneva, Y. Gogotsi *Electrospun Nanodiamonds-Polymer Composite Fibers and Coatings*, 236th American Chemical Society National Meeting, 17 - 23 Aug 2008, Philadelphia, PA USA
11. V. Mochalin, K. Behler, A. Stravato, J. Giammarco, S. Osswald, Y. Gogotsi *Surface Modification of Nanodiamond Powders for Advanced Composites and Biomedical Applications, NanoDiamond'2008*, 1 - 4 Jul 2008, St.Petersburg, Russia
10. V. Mochalin, S. Osswald, C. Portet, M. Havel, G. Yushin, C. Hobson, Y. Gogotsi *Nanodiamond Powders: Oxidation, Surface Functionalization and Phonon Confinement* (**Invited Presentation**), Materials Research Society 2007 Fall Meeting, 26 - 30 Nov 2007, Boston, MA USA
9. Y. Gogotsi, V. Mochalin, S. Osswald, G. Yushin, B. Legum *Surface Modification of Nanodiamond* (**Invited Presentation**), Diamond 2007, 9 - 14 Sep 2007, Berlin, Germany
8. V. Mochalin, S. Osswald, G. Yushin, S. Kucheyev, K. Behler, Y. Gogotsi *Characterization and Surface Modification of Nanodiamond*, 231st ACS National Meeting, 26 - 30 Mar 2006, Atlanta, GA USA
7. A. P. Yaroshenko, M.V. Savoskin, V. N. Mochalin, N. I. Lazareva, R. D. Mysyk *Using graphite intercalation compounds for producing exfoliated graphite - amorphous carbon - TiO_2 composites*, 13th International Symposium on Intercalation Compounds, 6 - 9 Jun 2005, Clermont - Ferrand, France. Symposium Proceeding. Blaise Pascal University, 2005. - P.54
6. A. P. Yaroshenko, M. V. Savoskin, V. N. Mochalin, N. I. Lazareva, R. D. Mysyk *Using graphite intercalation compounds for producing carbon - carbon composites*, 13th International Symposium on Intercalation Compounds, 6 - 9 Jun 2005, Clermont - Ferrand, France. Symposium Proceeding. Blaise Pascal University, 2005, P.34
5. M. V. Savoskin, A. P. Yaroshenko, V. N. Mochalin, N. I. Lazareva, T. E. Konstantinova *Intercalation as a Way to Carbon Nanoscrolls and Carbon - Carbon Composites*, NATO - CARWC "New Carbon Based Materials for Electrochemical Energy Storage Systems", 17 - 24 Oct 2003, Argonne National Laboratory, p.39

4. M. V. Savoskin, A. P. Yaroshenko, V. N. Mochalin, B. V. Panchenko, S. B. Lyubchik *Sorption of industrial oil by expanded graphite*, Proc. 3rd Int. Conf. “Oil Pollution: Prevention, Characterization, Clean Technology”, Vol. I, p. 156-161, 8 - 11 Oct 2002, Gdansk, Poland
3. A. I. Lutsyk, E. S. Rudakov, V. N. Mochalin *A new Calculation Method for Arenes Solubilities in the Whole Composition Range of Water - Sulfuric Acid System*, DGMK-Conference "The Future Role of Aromatics in Refining and Petrochemistry", p.201-205, 1999, Erlangen, Germany
2. A. I. Lutsyk, V. N. Mochalin, V. V. Zamaschikov *Accounting Media Effects in the Reaction of Isobutene Hydration*, 16th International Congress on the General and Applied Chemistry, Russia, Moscow, 1998, p.190-191
1. O. I. Lutsyk, V. M. Mochalin *Accounting Media Effects in the Reaction of Isobutene Hydration*, 6th Scientific Conference “L’vivski khimichni chitannya-97” (“Lviv’s Proceedings in Chemistry-97”), Ukraine, Lviv, 1997, p.85