Artem K. Grebenko

Senior Research Fellow, Department of Materials Science and Engineering, National University of Singapore
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Born 14 September 1991 · Russian (native), English (fluent), French and German (A2), Chinese (A1)

Research Interests

Two-dimensional and disordered carbon materials — graphene, monolayer amorphous carbon, carbon nanotube networks; nanofabrication and lithography for delicate and bio-organic systems; scanning probe microscopy and AFM-based patterning; charge and ion transport; terahertz, infrared, and impedance spectroscopy; applied atomically thin interfaces for interconnects, data storage, batteries, and catalysis.

Appointments

Senior Research Fellow since 06.2026
Department of Materials Science and Engineering, National University of Singapore
Experimental work on the monolayer amorphous carbon platform — growth, scanning-probe and spectroscopic characterization, and application studies — with an emphasis on interconnect-related materials and the industry programs listed below. Day-to-day mentoring of Ph.D. students.

Research Fellow 06.2024–06.2026
Department of Physics, National University of Singapore
2D materials and nanocarbon systems: monolayer amorphous carbon synthesis, characterization, and applications from dielectrics to battery and storage interfaces.

Research Fellow 06.2022–06.2024
Centre for Advanced 2D Materials, National University of Singapore
Scanning probe characterization, nanofabrication, and transport-relevant material platforms.

Senior Researcher 06.2021–03.2022
Programmable Functional Materials Laboratory, BSRC
Functional nanomaterials and programmable material systems.

Junior Researcher 09.2014–03.2022
Laboratory of Terahertz Spectroscopy, Moscow Institute of Physics and Technology
Charge transport and spectroscopy of carbon nanotube and bio-organic systems.

Research Intern 11.2018–11.2021
Laboratory of Nanomaterials, Skolkovo Institute of Science and Technology
Carbon nanomaterial synthesis, graphene growth, lithography, and AFM-based studies.

Research Intern 09.2013–06.2017
Laboratory of Electron Kinetics, Institute of Solid State Physics RAS
Scanning probe microscopy and electron-transport studies.

Junior Researcher (internship) 01–03.2013
iCeMS, Kyoto University

Education

Ph.D., Condensed Matter Physics 2017–2021
Skolkovo Institute of Science and Technology
Dissertation area: carbon nanomaterials, synthesis, and charge transport.

Ph.D., Biophysics 2015–2021
Moscow Institute of Physics and Technology
Dissertation area: fabrication techniques for charge-transfer studies in delicate materials.

M.Sc. with Honours, Physics 2013–2015
Moscow Institute of Physics and Technology
Department of General and Applied Physics; solid state physics track, research at ISSP RAS.

B.Sc. with Honours, Physics 2009–2013
Moscow Institute of Physics and Technology
Department of General and Applied Physics; physics and technology of nanostructures.

INDUSTRY ENGAGEMENT

Advanced-interconnect materials program ongoing
National University of Singapore, with semiconductor-industry partners
Member of the core experimental team whose results on atomically thin materials led to a Joint Development Project with **TSMC** on materials for advanced interconnects, and to joint research activities with **Tokyo Electron**, **Intel**, and **Ushio Inc.** within the same program. The project scope is confidential; the related public disclosures are the ultralow-k dielectric study [A1] below (arXiv:2606.29729; accepted in principle at *Nature Electronics*) and the NUS patent application WO 2024/253583.

SUPERVISION AND MENTORING

Day-to-day mentoring of Ph.D. students in the NUS 2D materials effort, carried through to joint first-author publications: adhesion and hard-disk overcoat studies with Hongji Zhang (*Advanced Materials* 2025 and 2026), lithium–carbon interface studies with Lu Shi (*Advanced Science* 2026; further manuscript under review), and an electrocatalysis study with the same cohort (under review).

PUBLICATIONS

Thirty-one peer-reviewed journal articles, one article accepted at *Nature Electronics*, four manuscripts under review. Author lists are abbreviated after the leading authors; † marks joint first authorship. Full record: Google Scholar, ORCID.

Accepted

A1 Chee-Tat Toh†, **Artem K. Grebenko**†, Ugur Karadeniz, Usha Bhat, Ya He, Hongji Zhang, et al., "Atomically Thin Amorphous Carbon with an Ultralow Dielectric Constant," arXiv:2606.29729 (2026); accepted in principle at *Nature Electronics*.

Journal articles

31 Mohammadreza Salehpoor, Natalia S. Khoteeva, **Artem K. Grebenko**, Elena S. Zhukova, Kirill E. Malgin, et al., "Graphene autocatalytic growth with percolation control on a dielectric substrate," *Results in Engineering* (2026), doi:10.1016/j.rineng.2026.109831.

30 Hongji Zhang†, **Artem K. Grebenko**†, Dmitrii Litvinov, Wenwen Zheng, Konstantin V. Iakoubovskii, et al., "Breaking the 2-nm Barrier in Hard Disk Drives Using Monolayer Amorphous Carbon Overcoats," *Advanced Materials* (2026), doi:10.1002/adma.202519149.

29 Lu Shi†, Hanning Zhang, **Artem K. Grebenko**†, Ruslan Yamaletdinov, Rejaul SK, et al., "Monolayer Amorphous Carbon: Unlocking Disorder-Induced Lithiophilicity," *Advanced Science* (2026), doi:10.1002/advs.202516490.

28 Hongji Zhang†, **Artem K. Grebenko**†, Konstantin V. Iakoubovskii, Hanning Zhang, Ruslan Yamaletdinov, Anna Makarova, et al., "Superior Adhesion of Monolayer Amorphous Carbon to Copper," *Advanced Materials* (2025), doi:10.1002/adma.202419112.

27 Mohammadreza Salehpoor, Natalia S. Khoteeva, **Artem K. Grebenko**, Sergey Yu. Luchkin, Nikita I. Raginov, et al., "Graphene visualization on non-conductive substrates with standard mechanical channels of atomic force microscopy," *Emergent Materials* (2025), doi:10.1007/s42247-025-01109-5.

26 Razmik A. Hovhannisyan, Sergey Grebenchuk, Semen A. Larionov, Andrey G. Shishkin, **Artem K. Grebenko**, et al., "Scanning vortex microscopy reveals thickness-dependent pinning nano-network in superconducting niobium films," *Communications Materials* (2025), doi:10.1038/s43246-025-00759-6.

25 Ilya V. Novikov, Nikita I. Raginov, Dmitry V. Krasnikov, Sergey S. Zhukov, Kirill V. Zhivetev, Andrii V. Ter-

entiev, Daniil A. Ilatovskii, Aly Elakshar, Eldar M. Khabushev, **Artem K. Grebenko**, et al., "Fast liquid-free patterning of SWCNT films for electronic and optical applications," *Chemical Engineering Journal* (2024), doi:10.1016/j.cej.2024.149733.

24 Nikolay V. Brilliantov, Alexey A. Tsukanov, **Artem K. Grebenko**, Albert G. Nasibulin, Igor A. Ostanin, "Atomistic mechanism of friction-force independence on the normal load and other friction laws for dynamic structural superlubricity," *Physical Review Letters* (2023), doi:10.1103/PhysRevLett.131.266201.

23 **Artem K. Grebenko**, Grigorii Drozdov, Yuriy G. Gladush, Igor Ostanin, Sergey S. Zhukov, Aleksandr V. Melentyev, Eldar M. Khabushev, et al., "Local ultra-densification of single-walled carbon nanotube films: Experiment and mesoscopic modeling," *Carbon* (2022), doi:10.1016/j.carbon.2022.05.047.

22 **Artem K. Grebenko**, Konstantin A. Motovilov, Anton V. Bubis, Albert G. Nasibulin, "Gentle patterning approaches toward compatibility with bio-organic materials and their environmental aspects," *Small* (2022), doi:10.1002/smll.202200476.

21 **Artem K. Grebenko**, Dmitry V. Krasnikov, Anton V. Bubis, Vasily S. Stolyarov, Denis V. Vyalikh, Anna A. Makarova, Alexander Fedorov, et al., "High-quality graphene using Boudouard reaction," *Advanced Science* (2022), doi:10.1002/advs.202200217.

20 **Artem Grebenko**, Anton Bubis, Konstantin A. Motovilov, Viacheslav V. Dremov, Evgeny V. Korostylev, Ivan Kindiak, Fedor S. Fedorov, et al., "Green lithography for delicate materials," *Advanced Functional Materials* (2021), doi:10.1002/adfm.202101533.

19 Boris D. Zaitsev, Andrey A. Teplykh, Fedor S. Fedorov, **Artem K. Grebenko**, Albert G. Nasibulin, Alexander P. Semyonov, Irina A. Borodina, "Evaluation of elastic properties and conductivity of chitosan acetate films in ammonia and water vapors using acoustic resonators," *Sensors* (2020), doi:10.3390/s20082236.

18 Pramod M. Rajanna, Sergey Luchkin, Konstantin V. Larionov, **Artem Grebenko**, Zakhar I. Popov, Pavel B. Sorokin, et al., "Adhesion of single-walled carbon nanotube thin films with different materials," *Journal of Physical Chemistry Letters* (2020), doi:10.1021/acs.jpclett.9b03552.

17 Grigorii Drozdov, Igor Ostanin, Hao Xu, Yuezhou Wang, Traian Dumitrica, **Artem Grebenko**, et al., "Densification of single-walled carbon nanotube films: Mesoscopic distinct element method simulations and experimental validation," *Journal of Applied Physics* (2020), doi:10.1063/5.0025505.

16 Fedor S. Fedorov, Maksim A. Solomatin, Margitta Uhlemann, Steffen Oswald, Dmitry A. Kolosov, Anatolii Morozov, Alexey S. Varezhnikov, Maksim A. Ivanov, **Artem K. Grebenko**, et al., "Quasi-2D Co_3O_4 nanoflakes as an efficient gas sensor versus alcohol VOCs," *Journal of Materials Chemistry A* (2020), doi:10.1039/d0ta00511h.

15 Vsevolod Ya. Iakovlev, Dmitry V. Krasnikov, Eldar M. Khabushev, Alena A. Alekseeva, **Artem K. Grebenko**, et al., "Fine-tuning of spark-discharge aerosol CVD reactor for single-walled carbon nanotube growth: The role of ex situ nucleation," *Chemical Engineering Journal* (2019), doi:10.1016/j.cej.2019.123073.

14 Polina M. Kalachikova, Elena D. Obraztsova, Konstantin B. Ustinovich, Anastasia Goldt, Eldar M. Khabushev, Timofei V. Eremin, **Artem K. Grebenko**, et al., "Direct injection of SWCNTs into liquid after supercritical nitrogen treatment," *Carbon* (2019), doi:10.1016/j.carbon.2019.06.003.

13 Orysia Zaremba, Anastasia Goldt, Maria Ramirez-Morales, Eldar M. Khabushev, Eugene Shulga, Timofei Eremin, Tatiana Prikazchikova, Anton Orekhov, **Artem Grebenko**, et al., "Robust technique for dispersion of single-walled carbon nanotubes in aqueous solutions with tRNA," *Carbon* (2019), doi:10.1016/j.carbon.2019.05.076.

12 Dmitry V. Krasnikov, Boris Yu. Zabelich, Vsevolod Ya. Iakovlev, Alexey P. Tsapenko, Stepan A. Romanov, Alena A. Alekseeva, **Artem K. Grebenko**, Albert G. Nasibulin, "A spark discharge generator for scalable aerosol CVD synthesis of single-walled carbon nanotubes with tailored characteristics," *Chemical Engineering Journal* (2019), doi:10.1016/j.cej.2019.04.173.

11 Boris D. Zaitsev, Alexander P. Semyonov, Fedor S. Fedorov, Andrey A. Teplykh, Irina A. Borodina, **Artem K. Grebenko**, et al., "Gas sensor based on the piezoelectric lateral electric field resonator and a gas-sensitive chitosan film," *Ural Radio Engineering Journal* (2019), doi:10.15826/urej.2019.3.3.005.

10 Daria S. Kopylova, Fedor S. Fedorov, Alena A. Alekseeva, Evgenia P. Gilshteyn, Alexey P. Tsapenko, Anton V. Bubis, **Artem K. Grebenko**, et al., "Holey single-walled carbon nanotubes for ultra-fast broadband bolometers,"

Nanoscale (2018), doi:10.1039/c8nr05925j.

9 Vsevolod Ya. Iakovlev, Yulia A. Sklyueva, Fedor S. Fedorov, Dmitry P. Rupasov, Vladislav A. Kondrashov, **Artem K. Grebenko**, et al., "Improvement of optoelectronic properties of single-walled carbon nanotube films by laser treatment," *Diamond and Related Materials* (2018), doi:10.1016/j.diamond.2018.07.006.

8 S. U. Piatrusha, L. V. Ginzburg, E. S. Tikhonov, D. V. Shovkun, G. Koblmüller, A. V. Bubis, **A. K. Grebenko**, A. G. Nasibulin, V. S. Khrapai, "Noise insights into electronic transport," *JETP Letters* (2018), doi:10.1134/S0021364018130039.

7 **Artem Grebenko**, Vyacheslav Dremov, Petr Barzilovich, Anton Bubis, Konstantin Sidoruk, Tatiyana Voeikova, et al., "Impedance spectroscopy of single bacterial nanofilament reveals water-mediated charge transfer," *PLOS ONE* (2018), doi:10.1371/journal.pone.0191289.

6 B. P. Gorshunov, E. S. Zhukova, Ju. S. Starovatykh, M. A. Belyanchikov, **A. K. Grebenko**, A. V. Bubis, et al., "Terahertz spectroscopy of charge transport in films of pristine and doped single-wall carbon nanotubes," *Carbon* (2018), doi:10.1016/j.carbon.2017.10.072.

5 Z. V. Gagkaeva, E. S. Zhukova, V. Grinenko, **A. K. Grebenko**, K. V. Sidoruk, T. A. Voeikova, M. Dressel, B. P. Gorshunov, "Terahertz-infrared spectroscopy of *Shewanella oneidensis* MR-1 extracellular matrix," *Journal of Biological Physics* (2018), doi:10.1007/s10867-018-9497-4.

4 K. A. Motovilov, M. Savinov, E. S. Zhukova, A. A. Pronin, Z. V. Gagkaeva, V. Grinenko, K. V. Sidoruk, T. A. Voeikova, P. Yu. Barzilovich, **A. K. Grebenko**, et al., "Observation of dielectric universalities in albumin, cytochrome C and *Shewanella oneidensis* MR-1 extracellular matrix," *Scientific Reports* (2017), doi:10.1038/s41598-017-15693-y.

3 E. S. Zhukova, **A. K. Grebenko**, A. V. Bubis, A. S. Prokhorov, M. A. Belyanchikov, A. P. Tsapenko, et al., "Terahertz-infrared electrodynamics of single-wall carbon nanotube films," *Nanotechnology* (2017), doi:10.1088/1361-6528/aa87d1.

2 Nadezhda V. Talagaeva, Polina A. Pisareva, **Artem K. Grebenko**, Mikhail A. Vorotyntsev, Elena V. Zolotukhina, "The method of double cathodic-anodic potential (current) pulses for synthesis of composite coatings Prussian blue-polypyrrole on optically transparent electrodes," *Russian Journal of Electrochemistry* (2016), doi:10.1134/s1023193516010110.

1 Vyacheslav Dremov, V. Fedoseev, Pavel Fedorov, **Artem Grebenko**, "Fast and reliable method of conductive carbon nanotube-probe fabrication for scanning probe microscopy," *Review of Scientific Instruments* (2015), doi:10.1063/1.4921323.

Under review

Artem K. Grebenko, et al., "Relativistic quasiparticles in 2D amorphous carbon," submitted (2026); first author.

Lu Shi†, **Artem K. Grebenko**†, et al., "Size-selective redistribution in early-stage lithium metal growth," submitted (2026).

Rejaul SK, Hanning Zhang, **Artem K. Grebenko**, Arsen Herasymchuk, Ranjith Shivajirao, Hongji Zhang, et al., "Quantum Criticality in Monolayer Amorphous Carbon," arXiv:2605.14349 (2026), submitted.

Lucas M. Sassi†, Hanning Zhang†, **Artem K. Grebenko**†, Hongji Zhang†, Rejaul SK, Artemii S. Ivanov, Lu Shi, et al., "Intrinsic Basal Plane Activity of Monolayer Amorphous Carbon for Hydrogen Evolution Reaction," submitted (2026).

Preprints and conference proceedings

Alena A. Alekseeva, Grigoriy B. Livshits, Andrei S. Klimovich, Stepan A. Romanov, Vladislav A. Kondrashov, **Artem K. Grebenko**, Dmitry V. Krasnikov, Albert G. Nasibulin, "Temporary Tattoo Transfer of Sub-Percolating Single-Walled Carbon Nanotube Films for High-Yield Thin Film Transistor Arrays," SSRN preprint (2025), doi:10.2139/ssrn.5082496.

Mohammadreza Salehpoor, Natalia Khoteeva, **Artem K. Grebenko**, Elena S. Zhukova, et al., "Percolation Threshold of Graphene Islands on a Dielectric Substrate," SSRN preprint (2025), doi:10.2139/ssrn.5249294.

A. L. Shilov, L. Elesin, **Artem Grebenko**, V. I. Kleshch, et al., "Nanopatterning of multicomponent van der Waals heterostructures using atomic force microscopy," arXiv preprint (2024), doi:10.48550/arXiv.2406.16354.

E. S. Zhukova, B. P. Gorshunov, A. P. Tsapenko, **A. K. Grebenko**, A. V. Bubis, S. S. Zhukov, et al., "Charge transport mechanisms in macro-scale CNT films," *Journal of Physics: Conference Series* (2018), doi:10.1088/1742-6596/1092/1/012178.

Konstantin A. Motovilov, Aleksei A. Pronin, Elena S. Zhukova, Zarina V. Gagkaeva, Victor I. Torgashev, Maxim Savinov, V. Grinenko, M. A. Belyanchikov, **Artem Grebenko**, et al., "On the issue of universal dielectric responses in proteins," IRMMW-THz 2016 Conference Proceedings, doi:10.1109/IRMMW-THz.2016.7758865.

PATENTS

2024	A dielectric material and method of forming the same. International patent application WO 2024/253583 (National University of Singapore; with B. Özyilmaz, C. T. Toh, U. Karadeniz; priority SG 10202301619T, 2023). National-phase applications EP 4724392, CN 121620488, JP 2026-519301, KR 10-2026-0047225.
2021	Use of chitosan compound in lithography. International patent application WO 2021/096394 (Skolkovo Institute of Science and Technology; first inventor); granted in Russia as RU 2738112 C1 (priority RU 2019136760, 2019).
2021	Method for producing graphene. International patent application WO 2021/002770 (Skolkovo Institute of Science and Technology; priority RU 2019120973, 2019).

TEACHING

2017–2021	Teaching assistant, *Review of Materials and Devices for Nano- and Optoelectronics*, Skolkovo Institute of Science and Technology.
2014–2017	Teaching assistant, *Atomic Force Microscopy*, Institute of Solid State Physics RAS.
2013–2015	Practical classes, *Advanced Mathematical Physics Equations*, Moscow Institute of Physics and Technology.
2013–2015	Practical classes, *Stochastic Processes in Physical Kinetics*, Moscow Institute of Physics and Technology.

GRANTS AND AWARDS

2020	Excellent Proposal Prize, Haldor Topsoe Fellowship Contest.
2019	Best Oral Talk, SNAIA 2019, Paris.
2014	OPTEC / Carl Zeiss grant for young scientists.
2019–2022	RSF Grant 19-73-10154, transport-relaxation characteristics of melanin and copper complexes for bioelectronics; team member.
2019–2022	RFBR Grant 18-29-19169, formation of carbon fibers from SWCNT networks and graphene; team member.
2019–2021	RFBR "Aspiranty" Grant 19-32-90143, synthesis and charge transfer in 2D metallo-organic complexes and van der Waals heterostructures with graphene; team member.
2016–2017	RFBR Grant 16-33-00592, nitric oxide delivery forms based on water-soluble polymer matrices with iron-sulfur complexes; team member.
2015–2018	RFBR "My First Grant" 16-34-00812, charge transport in biological nanofilaments; principal investigator.
2015–2017	RFBR Grant 15-02-04285, many-body kinetics and quantum statistics in nano- and microstructures; team member.

SELECTED TALKS AND CONFERENCE CONTRIBUTIONS

2025	MRS Spring Meeting, Seattle. Co-author: *In situ study of lithium plating and stripping dynamics on 2D carbon surfaces*.
2024	IPS Meeting, Singapore. Talk: *Energy-momentum dispersion in 2D amorphous carbon*; co-authored contributions on low-k dielectrics, lithium plating, and adhesion of 2D amorphous carbon.
2023	MRS Fall Meeting, Boston. Co-author: *Monolayer amorphous carbon as a 2D barrier*.
2022	IPS Meeting, Singapore. Talk: *Green lithography for delicate materials*.
2019	SNAIA, Paris. Talk: *Ambient-pressure single-layer graphene synthesis with millimeter crystalline size* (Best Oral Talk).
2019	ACNS, St. Petersburg. Talk: *AFM ultradensification of SWCNT networks: optical and mechanical properties*; poster on hydrogen-free single-crystal graphene synthesis.
2019	Bruker Scientific Seminar. Invited talk: *PeakForce QNM microscopy applied to low-dimensional carbon materials*.
2019	NAP, Odessa. Invited talk: *PeakForce MFM study of magnetic nanostructures*.
2016	IRMMW-THz, Copenhagen. *On the issue of universal dielectric responses in proteins*.
2015	EBSA, Dresden. *Direct measurements of charge transport in Shewanella oneidensis MR-1 conductive appendages*.
2015	IRMMW-THz, Hong Kong. Poster: *Terahertz and infrared spectroscopy of bacterial nanofilaments*.

EXPERIMENTAL AND TECHNICAL SKILLS

Fabrication	CVD synthesis of graphene, including an ambient-pressure Boudouard route, and layer-by-layer growth of atomically thin amorphous carbon; exfoliation, transfer, and stacking of 2D materials; electron-beam, optical, and AFM lithography; development of biocompatible resists and gentle patterning processes for delicate and bio-organic materials.
Microscopy	Atomic force microscopy, including PeakForce QNM nanomechanics and magnetic force microscopy; AFM-based patterning of films and van der Waals heterostructures; scanning tunneling microscopy; fabrication of carbon-nanotube SPM probes.
Spectroscopy	Terahertz–infrared and impedance spectroscopy; charge-transport and noise measurements from bacterial nanofilaments to nanocarbon devices; in situ studies of lithium plating and stripping and of electrocatalytic interfaces.
Computation	Python, C++, Java; analysis pipelines for microscopy and spectroscopy data; experiment–model integration with mesoscopic and atomistic simulation collaborators.
Leadership	Ph.D.-student mentoring carried to joint first-author publications; teaching from AFM practicals to mathematical physics; grant writing (RFBR principal investigator and team roles); coordination of experimental work inside NDA-bound industry programs.