ANTON V. IEVLEV

R&D Staff Member
Center for Nanophase Materials Sciences
Oak Ridge National Laboratory
E-mail: anton.ievlev@gmail.com; ievlevav@ornl.gov
Office phone: (865)-242-8658

Education

Ural Federal University, Ekaterinburg, Russia	Physics	PhD, 2012
Ural State University, Ekaterinburg, Russia	Physics	M.S., 2009
Ural State University, Ekaterinburg, Russia	Physics	B.S., 2007

Professional Experience

2017 – present	R&D Staff Scientist; Functional Atomic Force Microscopy Group, Center for Nanophase Materials Science, Oak Ridge National Laboratory
2013 - 2017	Postdoctoral Research Associate; Scanning Probe Microscopy Group, Center for Nanophase Materials Science, Oak Ridge National Laboratory
2012 – 2013	Researcher, Institute of Natural Sciences, Ural Federal University, Ekaterinburg, Russia
2006 – 2012	Junior Researcher, Institute of Physics and Applied Mathematics, Ural State University, Ekaterinburg, Russia

Awards and Honors

- 2012: Scholarship of the Government of Russian Federation
- 2011: Scholarship of the Government of Russian Federation
- 2010: Scholarship of the Governor of the Sverdlovsk Region

Research Accomplishments

- Papers in peer-reviewed journals: **120** published articles, h-index: **31** (Google Scholar); sum of the times cited: **3075** (Google Scholar); average citation per article: **25.6.**

Research Synopsis

- **Multimodal chemical and functional imaging** using combined capabilities of Atomic Force Microscopy, optical spectroscopy and Secondary Ion Mass Spectrometry for investigation of the correlation between chemical phenomena and physical functional response in wide range of systems (functional materials, soft materials, biological systems, etc.)
- **In-operando corelated studies in perovskite based devices:** Multimodal characterization of functional response and correlated structural and chemical phenomena in perovskite-based devices, including ferroelectrics, photovoltaics and catalytic materials.

- **Data analytics and AI** for automated interpretation of the multidimensional data in Physics, Chemistry and Material Sciences.

Professional Service

Associate editor of Scanning Journal

Reviewed manuscripts for multiple journals, including ACS, Nature, AIP families.

Organizing of the 1st International Workshop "Nanoscale Electromechanical phenomena in functional materials. Piezoresponse Force & Electrochemical Strain Microscopies".

PUBLICATIONS (125 papers in peer-review journals)

125. Pasterski M.J., Lorenz M., **Ievlev A.V.**, Wickramasinghe R.C., Hanley L., Kenig F., The Determination of the Spatial Distribution of Indigenous Lipid Biomarkers in an Immature Jurassic Sediment Using Time-of-Flight–Secondary Ion Mass Spectrometry, Astrobiology, 23(9), 1 (2023).

124. Kim W.J., Smeaton M.A., Jia Ch., Goodge B.H., Cho B.-G., Lee K., Osada M., Jost D., **Ievlev A.V.**, Moritz B., Kourkoutis L.F., Devereaux T.P., Hwang H.W., Geometric frustration of Jahn–Teller order in the infinite-layer lattice, Nature, 615 (7951), 237 (2023).

123. Bilkey N., Li H., Borodinov N., **Ievlev A.V.**, Ovchinnikova O.S., Dixit R., Foston M., Correlated mechanochemical maps of Arabidopsis thaliana primary cell walls using atomic force microscope infrared spectroscopy, Quantitative Plant Biology, 3, e31 (2022).

122. Hysmith H., Park S.Y., Yang J., **Ievlev A.V.**, Liu Y., Zhu K., Sumpter B.G., Berry J., Ahmadi M., Ovchinnikova O.S., The Role of SnO2 Processing on Ionic Distribution in Double-Cation–Double Halide Perovskites, ACS Applied Materials & Interfaces, 15(30), 36856 (2023).

121. Yang J., LaFollette D.K. Lawrie B.J., **Ievlev A.V.**, Kelley K.P., Kalinin S.V., Correa-Baena J.P., Ahmadi M., Understanding the Role of Cesium on Chemical Complexity in Methylammonium-Free Metal Halide Perovskites, Advanced Energy Materials, 2202880 (2022).

120. Neumayer S.M., **Ievlev A.V.**, Tselev A., Basun A.S., Conner B.S., Susner M.A., Maksymovych P., Polarization-controlled volatile ferroelectric and capacitive switching in $Sn_2P_2S_6$, Neuromorphic Computing and Engineering, 3(1), 014005 (2023)

119. Jetybayeva A., Borodinov N., **Ievlev A.V.**, Haque I., Hinkle J., Lamberti W.A., Meredith J.C., Abmayr D., Ovchinnikova O.S., A review on recent machine learning applications for imaging mass spectrometry studies, Journal of Applied Physics, 133(2), 020702 (2023).

118. Burns S.R, Tselev A., **Ievlev A.V.**, Agar J.C., Martin L.W., Kalinin S.V., Sando D., Maksymovych P., Tunable Microwave Conductance of Nanodomains in Ferroelectric $PbZr_{0.2}Ti_{0.8}O_3$ Thin Film, Advanced Electronic Materials, 8(3), 2100952 (2022).

117. Alikin D., Abramov A., Turygin A., **Ievlev A.V.**, Pryakhina V., Karpinsky D., Hu Q., Jin L., Shur V.Ya., Tselev A., Kholkin A., Exploring Charged Defects in Ferroelectrics by the Switching Spectroscopy Piezoresponse Force Microscopy, Small Methods, 6(2), 2101289 (2022).
116. Kim D., **Ievlev A.V.**, Ovchinnikova O.S., Kalinin S.V., Ahmadi M., Light–ferroelectric interaction in two-dimensional lead iodide perovskites, Journal of Materials Chemistry A, 10(18), 10120 (2022).
115. Burns S.R., Tselev A., **Ievlev A.V.**, Agar J.C., Martin L.W., Kalinin S.V., Sando D., Maksymovych P., Tunable Microwave Conductance of Nanodomains in Ferroelectric $PbZr_{0.2}Ti_{0.8}O_3$ Thin Film, Advanced Electronic Materials, 8(3), 2100952 (2022).
114. Liu Y., Wang M., **Ievlev A.V.**, Ahmadi A., Keum JK, Ahmadi M., Hu B., Ovchinnikova O.S., Photoinduced iodide repulsion and halides-demixing in layered perovskites, Materials Today Nano, 18, 100197 (2022).
113. Kim D., Lim J., Lee S., Soufiani A.M., Choi E., **Ievlev A.V.**, Borodinov N., Liu Y., Ovchinnikova O.S., Ahmadi M., Lim S., Sharma P., Seidel J., Noh J.H., Yun J.S., Microstructural Evaluation of Phase Instability in Large Bandgap Metal Halide Perovskites, ACSNano, 15(12), 20391 (2021).
112. Wickramasinghe R.C., Pasterski M.J., Kenig F., **Ievlev A.V.**, Lorenz M., Gross J.M., Hanley L., Femtosecond Laser Desorption Postionization MS vs ToF-SIMS Imaging for Uncovering Biomarkers Buried in Geological Samples, Analytical Chemistry, 93(48) 15949 (2021).
111. Kim D., Liu Y., **Ievlev A.V.**, Higgins K., Ovchinnikova O.S., Sung Yun J., Seidel J., Kalinin S.V., Ahmadi M. Unraveling the hysteretic behavior at double cations-double halides perovskite-electrode interfaces, Nano Energy, 89, 106428 (2021).
110. Liu Y., Borodinov N., Collins L., Ahmadi M., Kalinin S.V., Ovchinnikova O.S., **Ievlev A.V.**, Role of Decomposition Product Ions in Hysteretic Behavior of Metal Halide Perovskite, ACS Nano, 15(5), 9017 (2021)
109. Ovchinnikova O.S., Borodinov N., Trofimov A.A., King S.T., Lorenz M., Lamberti W., Abmayr D., **Ievlev A.V.**, Helium Ion Microscopy with Secondary Ion Mass Spectrometry for Nanoscale Chemical Imaging and Analysis of Polyolefins, ACS Applied Polymer Materials, 3(7), 3478 (2021)
108. Kim D., Liu Y., **Ievlev A.V.**, Higgins K., Ovchinnikova O.S., Yun J.S., Seidel J., Kalinin S.V., Ahmadi M., Unraveling the Hysteretic Behavior at Double Cations-Double Halides Perovskite–Electrode Interfaces, Nano Energy, 89B, 106428 (2021)
107. Lehmusto J., **Ievlev A.V.,** Cakmak E., Keiser J.R., Pint B.A., Oxidation of Metals doi: 10.1007/s11085-021-10071-6 (2021)
106. Weber J., Cheshire M., Bleuel M., Mildner D., Chang Y.-J., **Ievlev A.,** Littrell K.C., Ilavsky J., Stack A.G., Anovitz L.M., Influence of microstructure on replacement and porosity generation during experimental dolomitization of limestones, Geochimica et Cosmochimica Acta, 303, 127 (2021)
105. Liu Y., Kim D., **Ievlev A.V.,** Kalinin S.V., Ahmadi M., Ovchinnikova O.S., Ferroic Halide Perovskite Optoelectronics, Advanced Functional Materials, doi: 10.1002/adfm.202102793 (2021)
104. Yusoff A.R.., Mahata A., Vasilopoulou M., Ullah H., Hu B., Silva W.J., Schneider F.K., Gao P., **Ievlev A.V.**, Liu Y., Ovchinnikova O.S., Angelis F.D., Nazeeruddin M.K., Observation of large Rashba spin–orbit coupling at room temperature in compositionally engineered perovskite single crystals and application in high performance photodetectors, Materials Today, 46, 18 (2021)

103. Upadhyay N.K., Blum T., Maksymovych P., Lavrik N.V., Davila N., Katine J.A., **Ievlev A.V.**, Chi M., Xia Q., Yang J.J., Engineering Tunneling Selector to Achieve High Non-linearity for 1S1R Integration, Frontiers in Nanotechnology, 3, 28 (2021)
102. Sharma Y., Mazza A.R., Musico B.L., Skoropata E., Nepal R., Jin R., **Ievlev A.V.**, Collins L., Gai Z., Chen A., Brahlek M., Keppens V., Ward T.Z., Magnetic Texture in Insulating Single Crystal High Entropy Oxide Spinel Films, ACS Applied Materials & Interfaces, 13(15), 17971 (2021)
101. Liu Y., **Ievlev A.V.,** Borodinov N., Lorenz M., Xiao K., Ahmadi M., Hu B., Kalinin S.V., Ovchinnikova O.S., Direct Observation of Photoinduced Ion Migration in Lead Halide Perovskites, Advanced Functional Materials, 31(8), 2008777 (2021)
100. Ben-Naim M., Liu Y., Stevens M.B., Lee K., Wette M.R., Boubnov A., Trofimov A.A, **Ievlev A.V.**, Belianinov A., Davis R.C., Clemens B.M., Bare S.R., Hikita Y., Hwang H.Y., Higgins D.C., Sinclair R., Jaramillo T.F., Understanding Degradation Mechanisms in SrIrO3 Oxygen Evolution Electrocatalysts: Chemical and Structural Microscopy at the Nanoscale, Advanced Functional Materials, 31(34), 2101542 (2021)
99. Stevens M.B., Kreider M.E., Patel A.M., Wang Z., Liu Y., Gibbons B.M., Statt M.J., **Ievlev A.V.**, Sinclair R., Mehta A., Davis R.C., Nørskov J.K., Gallo A., King L.A., Jaramillo T.F., Identifying and tuning the in situ oxygen-rich surface of molybdenum nitride electrocatalysts for oxygen reduction, ACS Applied Energy Materials, 3 (12), 12433 (2020)

98. Khatiwada D., Favela C.A., Sun S., Zhang C., Sharma S., Rathi M., Dutta P., Galstyan E., Belianinov A., **Ievlev A.V.**, Pouladi S., Fedorenko A., Ryou J.-H., Hubbard S., Selvamanickam V., *High-efficiency single-junction p-i-n GaAs solar cell on roll-to-roll epi-ready flexible metal foils for low-cost photovoltaics*, PROGRESS IN PHOTOVOLTAICS: RESEARCH AND APPLICATIONS, 28 (11), 1107 (2020)
97. Brady M.P., Rother G., Frith M.G., **Ievlev A.V.**, Leonard D.N., Littrell K.C., Cakmak E., Meyer III H.M., Anovitz L.M., Davis B., *Temporal Evolution of Corrosion Film Nano-Porosity and Magnesium Alloy Hydrogen Penetration in NaCl Solution*, JOURNAL OF THE ELECTROCHEMICAL SOCIETY, 167 (13), 131513 (2020)
96. Koshy D.M., Landers A.T., Cullen D.A., **Ievlev A.V.**, Meyer III H.M., Hahn C., Bao Z., Jaramillo T.F., *Direct Characterization of Atomically Dispersed Catalysts: Nitrogen-Coordinated Ni Sites in Carbon-Based Materials for CO_2 Electroreduction*, ADVANCED ENERGY MATERIALS, 10 (39), 2001836 (2020)
95. Liu Y., Borodinov N, Ahmadi M., Kalinin S.V., Lorenz M., **Ievlev A.V.**, Ovchinnikova O.S., *Hysteretic Ion Migration and Remanent Field in Metal Halide Perovskites*, ADVANCED SCIENCE, 7 (19), 2001176 (2020)
94. Liu Y., **Ievlev A.V.**, Collins L., Belianinov A., Keum J.K., Ahmadi M., Jesse S., Retterer S.T., Xiao K., Huang J., Sumpter B.G., Kalinin S.V., Hu B., Ovchinnikova O.S., *Strain–Chemical Gradient and Polarization in Metal Halide Perovskites*, ADVANCED ELECTRONIC MATERIALS, 6(4), 1901235 (2020)
93. Liu Y., Lorenz M., **Ievlev A.V.**, Ovchinnikova O.S., *Secondary Ion Mass Spectrometry (SIMS) for Chemical Characterization of Metal Halide Perovskites*, ADVANCED FUNCTIONAL MATERIALS, 30(35), 2002201 (2020)
92. Li X., Dyck O., Unocic R.R., **Ievlev A.V.**, Jesse S., Kalinin S.V., *Statistical learning of governing equations of dynamics from in-situ electron microscopy imaging data*, MATERIALS & DESIGN, doi: 10.1016/j.matdes.2020.108973 (2020)
91. Higgins K., Lorenz M., Ziatdinov M., Vasudevan R.K., **Ievlev A.V.**, Lukosi E.D., Ovchinnikova O.S., Kalinin S.V., Ahmadi M., *Exploration of Electrochemical Reactions at*

Organic–Inorganic Halide Perovskite Interfaces via Machine Learning in In Situ Time-of-Flight Secondary Ion Mass Spectrometry, ADVANCED FUNCTIONAL MATERIALS, doi: 10.1002/adfm.202001995 (2020)

90. Borodinov N., Lorenz M., King S.T., **Ievlev A.V.**, Ovchinnikova O.S., *Toward nanoscale molecular mass spectrometry imaging via physically constrained machine learning on co-registered multimodal data*, NPJ COMPUTATIONAL MATERIALS, 6(1), 1 (2020)
89. Ovchinnikova O.S., Borodinov N., Trofimov A.A., King S.T., Lorenz M., Lamberti W., Abmayr D., **Ievlev A.V.**, *Helium Ion Microscopy with Secondary Ion Mass Spectrometry (HIM-SIMS) for the analysis and quantitation of polyolefins*, BEILSTEIN ARCHIVES, 2020(1), 76, (2020)
88. Florez F.L.E., Trofimov A.A., **Ievlev A.V.**, Qian S., Rondinone A.J., Khajotia S.S., *Advanced characterization of surface-modified nanoparticles and nanofilled antibacterial dental adhesive resins*, SCIENTIFIC REPORTS, 10(1), 1 (2020)
87. Belianinov A., Burch M.J., **Ievlev A.V.**, Kim S., Stanford M.G., Mahady K., Lewis B.B., Fowlkes J.D., Rack P.D., Ovchinnikova O.S., *Direct Write of 3D Nanoscale Mesh Objects with Platinum Precursor via Focused Helium Ion Beam Induced Deposition*, MICROMACHINES, 11(5), 527 (2020)
86. Brand A.S., Feldman S.B., Stutzman P.E., **Ievlev A.V.**, Lorenz M., Pagan D.C., Nair S., Gorham J.M., Bullard J.W., *Dissolution and initial hydration behavior of tricalcium aluminate in low activity sulfate solutions*, CEMENT AND CONCRETE RESEARCH, 130, 105989 (2020)
85. Kreider M.E., Stevens M.B., Liu Y., Patel A.M., Statt M.J., Gibbons B.M., Gallo A., Ben-Naim M., Mehta A., Davis R.C., **Ievlev A.V.**, Nørskov J.K., Sinclair R., King L.A., Jaramillo T.F., *Nitride or Oxynitride? Elucidating the Composition–Activity Relationships in Molybdenum Nitride Electrocatalysts for the Oxygen Reduction Reaction*, CHEMISTRY OF MATERIALS, 32(7), 2946 (2020)
84. Liu Y., **Ievlev A.V.**, Collins L., Borodinov N., Belianinov A., Keum J.K., Wang M., Ahmadi M., Jesse S., Xiao K., Sumpter B.G., Hu B., Kalinin S.V., Ovchinnikova O.S., *Light-Ferroic Interaction in Hybrid Organic–Inorganic Perovskites*, ADVANCED OPTICAL MATERIALS, 7(23), 1901451 (2019)
83. Liu Y., Li M., Wang M., Collins L., **Ievlev A.V.**, Jesse S., Xiao K., Hu B., Belianinov A., Ovchinnikova O.S., *Twin domains modulate light-matter interactions in metal halide perovskites*, APL MATERIALS, 8(1), 011106 (2020)
82. Sharma Y., Agarwal R., Collins L., Zheng Q., **Ievlev A.V.**, Hermann R.P., Cooper V.R., KC Santosh, Ivanov I.N., Katiyar R.S., Kalinin S.V., Lee H.N., Hong S., Ward T.Z., *Self-Assembled Room Temperature Multiferroic $BiFeO_3$-$LiFe_5O_8$ Nanocomposites*, ADVANCED FUNCTIONAL MATERIALS, 30(3), 1906849 (2020)
81. Liu Y., Belianinov A., Collins L., Proksch R., **Ievlev A.V.**, Hu B., Kalinin S.V., Ovchinnikova O.S., *Ferroic twin domains in metal halide perovskites*, MRS ADVANCES, 4(51), 2817 (2020)
80. Liu Y., Collins L., Proksch R., Kim S., Watson B.R., Doughty B., Calhoun T.R., Ahmadi M., **Ievlev A.V.**, Jesse S., Retterer S.T., Belianinov A., Xiao K., Huang J., Sumpter B.G., Kalinin S.V., Hu B., Ovchinnikova O.S., *Reply to: On the ferroelectricity of $CH_3NH_3PbI_3$ perovskites*, NATURE MATERIALS, 18(10), 1051 (2019)
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Book chapters (2 chapters):

1. **Ievlev A.V.**, Tselev A., Vasudevan R., Kalinin S.V., Morozovska A., Maksymovych P., Chapter 11: "Nanoscale ferroelectric switching - a method to inject and study non-equilibrium domain walls" in Domain Walls book edited by Dennis Meier, Jan Seidel, Marty Gregg, and Ramamoorthy Ramesh, ISBN: 9780198862499

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Patents

1. **Ievlev A.V.**, Ovchinnikova O.S., Lorenz M., Liu Y., Time-resolved chemical studies via time-of-flight secondary ion mass spectrometry, **US Patent 11,355,336** (Jun 2022).
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Invited talks and tutorials at meetings and conferences (9 invited, 1 tutorial and 1 keynote):

1. "Correlation of the physical properties and chemical phenomena in ferroelectric materials through multimodal chemical and functional imaging", International Materials Research Congress 2017, Cancun Mexico, August 2017
2. "Ferroelectric domain walls: from insulators to conductors and back again", International Materials Research Congress 2017, Cancun Mexico, August 2017
3. "Bottom-up understanding layered ferroelectric thiophosphates – a unique challenge for scanning probe methods toward complex 2D materials and interfaces", International Materials Research Congress 2017, Cancun Mexico, August 2017
4. "Unsupervised Learning in Spectral Materials Data", MRS Fall Meeting 2016, Boston MA, November 2017 **(tutorial)**
5. "Multimodal chemical and functional imaging of functional materials via combined AFM/ToF-SIMS platform", SIMS Europe 2018, Munster, Germany September 2018
6. "Electrochemical Phenomena of Polarization Switching in Ferroelectrics", Fall MRS meeting 2018, Boston MA, November 2018
7. "Unravelling Origin of Functionality via Correlative Multimodal Chemical Imaging", Workshop "Latest Advances in AFM, nanoIR and Nanoindenters: New Modes to Enable New Research", University of Central Florida, Orlando FL, February 12-13, 2019 (**Keynote talk**)
8. "Electrochemical Phenomena of Polarization Switching in Ferroelectrics" Russian Conference of Ferroelectics, Ekaterinburg Russia, August 2020 (**Virtual Invited talk**)
9. "Time-resolved SIMS investigations of chemical phenomena in functional materials", Virtual Fall MRS meeting 2020, November 2020 (**Virtual Invited talk**)

PhD and Pos-doctoral supervisors:

1. **Vladimir Ya. Shur** (BS, MS, PhD supervisor)
   Ural Federal University, Ekaterinburg, Russia
   Email: vladimir.shur@urfu.ru
2. **Sergei V. Kalinin** (Post-doc supervisor)
   Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
   Email: sergei2@ornl.gov; Phone: (865) 241-0236