



Arturas Vailionis

Senior Research Scientist - Physical
Shared Facilities

CONTACT INFORMATION

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Bio

BIO

Dr. Arturas Vailionis has been an integral part of Stanford University since 2000, serving as the Senior Staff Scientist at Stanford Nano Shared Facilities (SNSF).

Within SNSF, he oversees the X-ray Lab, comprising X-ray Diffraction and X-ray Computed Tomography instruments. Additionally, Dr. Vailionis plays a key role as the core lead of the X-ray and Surface Analysis (XSA) group at SNSF. He also holds a Lecturer position in the Materials Science & Engineering Department and serves as a visiting professor at Kaunas University of Technology in Lithuania.

Dr. Vailionis earned his PhD from the Royal Institute of Technology, where he focused on the growth and structural characterization of high-Tc superconductor thin films. Subsequently, he conducted research in the group of Prof. Joe Greene at the University of Illinois at Urbana Champaign, investigating atomic structure, morphology, and growth kinetics of semiconductor and nitride thin films using X-ray Diffraction and Scanning Probe Microscopy.

Dr. Vailionis research interests encompass a wide range of X-ray scattering techniques aimed at understanding structural properties of materials at the atomic level, particularly focusing on complex oxide thin films and heterostructures. He has coauthored over 100 publications covering topics such as microstructure, electronic, and magnetic properties in thin films. Additionally, his expertise extends to tomographic imaging of inorganic and biological materials.

ACADEMIC APPOINTMENTS

- Sr Res Scientist-Physical, Shared Facilities

PROFESSIONAL EDUCATION

- M.Sc., Vilnius University, Vilnius, Lithuania , Growth of Oxide Thin Films by Magnetron Sputtering and Characterization (1989)
- Ph. D., Royal Institute of Technology, Stockholm, Sweden , Microstructural Properties of Oxide Thin Films Studied by X-ray Diffraction and Extended X-ray Absorption Fine Structure. (1997)

LINKS

- Google Scholar Profile: <https://scholar.google.com/citations?user=HwQQGhgAAAAJ&hl=en>

Teaching

COURSES

2023-24

- X-Ray Diffraction Laboratory: MATSCI 162, MATSCI 172, PHOTON 172 (Win)

2022-23

- X-Ray Diffraction Laboratory: MATSCI 162, MATSCI 172, PHOTON 172 (Win)

2021-22

- X-Ray Diffraction Laboratory: MATSCI 162, MATSCI 172, PHOTON 172 (Win)

Publications

PUBLICATIONS

- **Solvent-mediated oxide hydrogenation in layered cathodes.** *Science (New York, N.Y.)*
Wan, G., Pollard, T. P., Ma, L., Schroeder, M. A., Chen, C. C., Zhu, Z., Zhang, Z., Sun, C. J., Cai, J., Thaman, H. L., Vailionis, A., Li, H., Kelly, et al
2024; 385 (6714): 1230-1236
- **Understanding and Harnessing Nanoscale Immiscibility in Ru-In Alloys for Selective CO₂ Hydrogenation.** *Journal of the American Chemical Society*
Zhou, C., Liccardo, G., Hoffman, A. S., Oh, J., Holmes, S. E., Vailionis, A., Bare, S. R., Cargnello, M.
2024
- **Reciprocal space x-ray computed tomography** *APL MATERIALS*
Vailionis, A., Wu, L., Spanier, J. E.
2024; 12 (5)
- **Room-Temperature Ferroelectric Epitaxial Nanowire Arrays with Photoluminescence.** *Nano letters*
Le, H. K., Zhang, Y., Behera, P., Vailionis, A., Phang, A., Brinn, R. M., Yang, P.
2024
- **Author Correction: Ultra-thin lithium aluminate spinel ferrite films with perpendicular magnetic anisotropy and low damping.** *Nature communications*
Zheng, X. Y., Channa, S., Riddiford, L. J., Wissner, J. J., Mahalingam, K., Bowers, C. T., McConney, M. E., N'Diaye, A. T., Vailionis, A., Cogulu, E., Ren, H., Galazka, Z., Kent, et al
2024; 15 (1): 534
- **Revelation of Tooth Structural Integrity at the Microcrack Site Using Multi-Modal Imaging**
Dumbryte, I., Narbutis, D., Androulidaki, M., Jasiuniene, E., Vailionis, A., Juodkazis, S., Malinauskas, M., Popp, J., Gergely, C.
SPIE-INT SOC OPTICAL ENGINEERING.2024
- **Teeth Microcracks Research: Towards Multi-Modal Imaging.** *Bioengineering (Basel, Switzerland)*
Dumbryte, I., Narbutis, D., Androulidaki, M., Vailionis, A., Juodkazis, S., Malinauskas, M.
2023; 10 (12)
- **Correlating chemistry and mass transport in sustainable iron production.** *Proceedings of the National Academy of Sciences of the United States of America*
Zheng, X., Paul, S., Moghimi, L., Wang, Y., Vilá, R. A., Zhang, F., Gao, X., Deng, J., Jiang, Y., Xiao, X., Wu, C., Greenburg, L. C., Yang, et al
2023; 120 (43): e2305097120
- **Aluminum substitution in low damping epitaxial lithium ferrite films** *APPLIED PHYSICS LETTERS*
O'Mahoney, D., Channa, S., Zheng, X., Vailionis, A., Shafer, P., N'Diaye, A. T., Klewe, C., Suzuki, Y.
2023; 123 (17)
- **Enhanced functionality of Scots pine sapwood by in situ hydrothermal synthesis of GdPO₄•H₂O:Eu³⁺Composites in woods matrix** *CERAMICS INTERNATIONAL*
Baublyte, M., Vailionis, A., Sokol, D., Skaudzius, R.
2023; 49 (19): 31255-31264
- **Low-temperature carbon dioxide conversion via reverse water-gas shift thermochemical looping with supported iron oxide** *CELL REPORTS PHYSICAL SCIENCE*
Sun, E., Wan, G., Haribal, V., Gigantino, M., Marin-Quiros, S., Oh, J., Vailionis, A., Tong, A., Randall, R., Rojas, J., Gupta, R., Majumdar, A.
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- **Ultra-thin lithium aluminate spinel ferrite films with perpendicular magnetic anisotropy and low damping.** *Nature communications*

- Zheng, X. Y., Channa, S., Riddiford, L. J., Wisser, J. J., Mahalingam, K., Bowers, C. T., McConney, M. E., N'Diaye, A. T., Vailionis, A., Cogulu, E., Ren, H., Galazka, Z., Kent, et al
2023; 14 (1): 4918
- **Quantification of strain and its impact on the phase stabilization of all-inorganic cesium lead iodide perovskites** *MATTER*
Le, H. D., Lin, C., Jin, J., Zhang, Y., Lin, Z., Vailionis, A., Tamura, N., Yang, P.
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 - **Field-free spin-orbit torque switching assisted by in-plane unconventional spin torque in ultrathin [Pt/Co]N.** *Nature communications*
Xue, F., Lin, S. J., Song, M., Hwang, W., Klewe, C., Lee, C. M., Turgut, E., Shafer, P., Vailionis, A., Huang, Y. L., Tsai, W., Bao, X., Wang, et al
2023; 14 (1): 3932
 - **Structure and Optical Anisotropy of Spider Scales and Silk: The Use of Chromaticity and Azimuth Colors to Optically Characterize Complex Biological Structures.** *Nanomaterials (Basel, Switzerland)*
Linklater, D., Vailionis, A., Ryu, M., Kamegaki, S., Morikawa, J., Mu, H., Smith, D., Maasoumi, P., Ford, R., Katkus, T., Blamires, S., Kondo, T., Nishijima, et al
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 - **Observation of anti-damping spin-orbit torques generated by in-plane and out-of-plane spin polarizations in MnPd3.** *Nature materials*
Dc, M., Shao, D. F., Hou, V. D., Vailionis, A., Quarterman, P., Habiboglu, A., Venuti, M. B., Xue, F., Huang, Y. L., Lee, C. M., Miura, M., Kirby, B., Bi, et al
2023
 - **Large Spin-Orbit-Torque Efficiency and Room-Temperature Magnetization Switching in SrIrO₃/Co-Fe-B Heterostructures** *PHYSICAL REVIEW APPLIED*
Li, P., Channa, S., Li, X., Alahmed, L., Tang, C., Yi, D., Riddiford, L., Wisser, J., Balakrishnan, P. P., Zheng, X., Lu, D., Vailionis, A., Wang, et al
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 - **Investigation of the Antimicrobial Properties of Beetroot-Gelatin Films Containing Silver Particles Obtained via Green Synthesis** *APPLIED SCIENCES-BASEL*
Puiso, J., Adliene, D., Paskevicius, A., Vailionis, A.
2023; 13 (3)
 - **Revelation of microcracks as tooth structural element by X-ray tomography and machine learning.** *Scientific reports*
Dumbryte, I., Narbutis, D., Vailionis, A., Juodkazis, S., Malinauskas, M.
2022; 12 (1): 22489
 - **Strain engineering during epitaxial growth of oxides** *Epitaxial Growth of Complex Metal Oxides*
Vailionis, A.
Woodhead Publishing.2022; 2nd: 159
 - **Three-dimensional non-destructive visualization of teeth enamel microcracks using X-ray micro-computed tomography.** *Scientific reports*
Dumbryte, I., Vailionis, A., Skliutas, E., Juodkazis, S., Malinauskas, M.
2021; 11 (1): 14810
 - **Charge-spin interconversion in epitaxial Pt probed by spin-orbit torques in a magnetic insulator** *PHYSICAL REVIEW MATERIALS*
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 - **Emergent long-range magnetic order in ultrathin (111)-oriented LaNiO₃ films** *NPJ QUANTUM MATERIALS*
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 - **Three-Dimensional Analysis of Particle Distribution on Filter Layers inside N95 Respirators by Deep Learning.** *Nano letters*
Lee, H. R., Liao, L., Xiao, W., Vailionis, A., Ricco, A. J., White, R., Nishi, Y., Chiu, W., Chu, S., Cui, Y.
2020
 - **Two-dimensional electron systems in perovskite oxide heterostructures: Role of the polarity-induced substitutional defects** *PHYSICAL REVIEW MATERIALS*
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 - **Extreme tensile strain states in La_{0.7}Ca_{0.3}MnO₃ membranes.** *Science (New York, N.Y.)*

- Hong, S. S., Gu, M. n., Verma, M. n., Harbola, V. n., Wang, B. Y., Lu, D. n., Vailionis, A. n., Hikita, Y. n., Pentcheva, R. n., Rondinelli, J. M., Hwang, H. Y. 2020; 368 (6486): 71–76
- **Modification of spin-ice physics in Ho₂Ti₂O₇ thin films** *PHYSICAL REVIEW MATERIALS*
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 - **Nanoscale optical and structural characterisation of silk.** *Beilstein journal of nanotechnology*
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 - **Nanoscale optical and structural characterisation of silk** *BEILSTEIN JOURNAL OF NANOTECHNOLOGY*
Ryu, M., Handa, R., Cernescu, A., Vailionis, A., Balcytis, A., Vongsvivut, J., Li, J., Linklater, D. P., Ivanova, E. P., Mizeikis, V., Tobin, M. J., Morikawa, J., Juodkazis, et al 2019; 10: 922–29
 - **Modification of spin-ice physics in Ho₂Ti₂O₇ thin films.** *Physical review materials*
Barry, K., Zhang, B., Anand, N., Xin, Y., Vailionis, A., Neu, J., Heikes, C., Cochran, C., Zhou, H., Qiu, Y., Ratcliff, W., Siegrist, T., Beekman, et al 2019; 3
 - **Depth-resolved resonant inelastic x-ray scattering at a superconductor/half-metallic-ferromagnet interface through standing wave excitation** *PHYSICAL REVIEW B*
Kuo, C., Lin, S., Ghiringhelli, G., Peng, Y., De Luca, G., Di Castro, D., Betto, D., Gehlmann, M., Wijnands, T., Huijben, M., Meyer-Ilse, J., Gullikson, E., Kortright, et al 2018; 98 (23)
 - **Strain Tuning in Complex Oxide Epitaxial Films Using an Ultrathin Strontium Aluminate Buffer Layer** *PHYSICA STATUS SOLIDI-RAPID RESEARCH LETTERS*
Lu, D., Hikita, Y., Baek, D. J., Merz, T. A., Sato, H., Kim, B., Yajima, T., Bell, C., Vailionis, A., Kourkoutis, L. F., Hwang, H. Y. 2018; 12 (3)
 - **Robust Pinhole-free Li₃N Solid Electrolyte Grown from Molten Lithium.** *ACS central science*
Li, Y., Sun, Y., Pei, A., Chen, K., Vailionis, A., Li, Y., Zheng, G., Sun, J., Cui, Y. 2018; 4 (1): 97–104
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 - **Tuning Perpendicular Magnetic Anisotropy by Oxygen Octahedral Rotations in (La_{1-x}Sr_xMnO₃)/(SrIrO₃) Superlattices.** *Physical review letters*
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Noad, H., Spanton, E. M., Nowack, K. C., Inoue, H., Kim, M., Merz, T. A., Bell, C., Hikita, Y., Xu, R., Liu, W., Vailionis, A., Hwang, H. Y., Moler, et al 2016; 94 (17)
 - **Ultrafast terahertz-field-driven ionic response in ferroelectric BaTiO₃** *PHYSICAL REVIEW B*
Chen, F., Zhu, Y., Liu, S., Qi, Y., Hwang, H. Y., Brandt, N. C., Lu, J., QUIRIN, F., Enquist, H., Zalden, P., Hu, T., Goodfellow, J., Sher, et al

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2016; 16 (9): 5647-5651
- **Depth resolved domain mapping in tetragonal SrTiO₃ by micro-Laue diffraction** *APPLIED PHYSICS LETTERS*
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2016; 108 (18)
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2015; 3 (7)
- **The effects of strain on crystal structure and properties during epitaxial growth of oxides** *Epitaxial Growth of Complex Metal Oxides*
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- **The application of floating dies for high speed growth of CsI single crystals by edge-defined film-fed growth (EFG)** *JOURNAL OF CRYSTAL GROWTH*
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- **Symmetry and lattice mismatch induced strain accommodation near and away from correlated perovskite interfaces** *APPLIED PHYSICS LETTERS*
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- **High-Temperature Magnetic Insulating Phase in Ultrathin La_{0.67}Sr_{0.33}MnO₃ Films** *PHYSICAL REVIEW LETTERS*
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Mizeikis, V., Vailionis, A., Gamaly, E. G., Yang, W., Rode, A., Juodkazis, S.
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Juodkazis, S., Kohara, S., Ohishi, Y., Hirao, N., Vailionis, A., Mizeikis, V., Saito, A., Rode, A.
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- **Misfit strain accommodation in epitaxial ABO₃ perovskites: Lattice rotations and lattice modulations** *PHYSICAL REVIEW B*
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