Joshua A. **Taillon**

Research Software Engineer · Materials Research Engineer · Data Scientist and Solutions Architect

Boulder, CO

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Summary

Hello!

I am an ***internationally recognized*** expert in ***scientific data management***, real-world ***data engineering*** solutions, ***scientific programming***, and ***materials research***. Since 2018, I have spearheaded efforts to modernize data management practices at NIST in diverse domains ranging from electron microscopy, to mechanical materials testing, to biosystems and biomaterials research. I have ***led technical development*** on a range of impactful projects, focusing on ***Laboratory Information Management*** (LIMS) and experimental metadata capture, including both backend systems and frontend interfaces. I have led federally-funded working groups on advancing data management practices in materials research and am regularly invited to speak at both international and domestic scientific conferences.

I have a passion for ***open source software*** and sharing my knowledge and experience with others. I am a *Software Carpentries* certified instructor and often run tutorial sessions and short course seminars on both general and scientific programming. I place great emphasis on building ***comprehensible***, ***well documented***, and ***scalable*** software solutions that empower researchers to accelerate scientific discoveries and leverage the latest AI/ML strategies. Outside of work, I regularly publish and contribute to various open-source side projects, have been a Linux enthusiast since 2010, enjoy building home and personal data automation pipelines and self-hosting applications, and am an avid cyclist.

Current Appointment

National Institute of Standards and Technology — *Boulder, CO*

Materials Research Engineer · Data Science Group · Office of Data and Informatics — *September 2018 - PRESENT*

Technical Skills

Scientific/General Programming	Python, JavaScript, R, MATLAB, OpenCV, Linux coreutils/bash, Java, LaTeX, HPC, Make Owner/maintainer of projects totaling nearly 1,000 stars on GitHub
Software Development/DevOps	Git, Docker, Kubernetes, Github Actions, Azure pipelines, AWS (S3, EC2, etc.), Gitlab CI/CD, Ansible, Chef, pytest, Test-driven development, Python packaging (`conda`, `poetry`, `uv`, PyPI, etc.), Proxmox, Reverse engineering, Bluetooth LE communication, API consumption, Sphinx documentation, mkdocs
Data Engineering and Processing	SQL (PostgreSQL, SQLite, SQLAlchemy, SQLModel), Pandas, NumPy, NoSQL databases, web scraping, InfluxDB, Apache Airflow, Data modeling: LinkML, `pydantic`, JSONSchema, JSON-LD, XML Schema/XSLT
Data Presentation	Plotly Dash, Streamlit, Jupyter Notebooks, Django, Matplotlib, Reveal.js, RShiny, Jekyll, Hugo
Machine Learning	Scikit-learn, Keras, TensorFlow, unsupervised learning, signal separation, compressed sensing
Materials Characterization	Extensive experience with FIB (Ga^+/Xe^+), SEM, TEM, Nanotomography, EDS, EELS, XPS, EBSD, XRD, etc.
Presentation/Writing	11 reviewed publications, 13 proceedings, 50+ presentations (21 invited) – 712 total citations; *h-index:* 11

Education

University of Maryland, College Park — *College Park, MD*

Ph.D./M.S. in Materials Science and Engineering · GPA: 3.964 — *August 2016/May 2014*

- Thesis: *Advanced analytical microscopy at the nanoscale: Applications in wide bandgap and solid oxide fuel cell materials*
- Advised by Prof. Lourdes Salamanca-Riba
- NSF Graduate Research Fellow

Cornell University — *Ithaca, NY*

B.S. in Materials Science and Engineering · GPA: 3.872 — *June 2011*

- Graduated *Magna cum laude* with departmental honors
- Minor in Applied Economics and Management
- Senior research thesis in computational materials science

Research/Technical Experience

National Institute of Standards and Technology
Boulder, CO

Materials Research Engineer · Office of Data and Informatics · Data Science Group
September 2018 - PRESENT

Staff scientist within the Material Measurement Laboratory at NIST, focused on working directly with other researchers to address data and workflow challenges through novel data management solutions. I have in-depth technical proficiency as well as experience leading both project teams and federally-funded working groups. Selected highlights from my time at NIST include:

- Designed, implemented, deployed, and maintained usnistgov/NexusLIMS – a laboratory information management system (LIMS) to automatically harvest, categorize, and display data from dozens of electron microscopes and associated spectrometers (Python, Django, SQLite, MongoDB)
- Published ETSpy – usnistgov/etspy – a HyperSpy extension package to facilitate electron tomographic data analysis (Python, Jupyter, Sphinx)
- Proposed, architected, and implemented an internal staff scheduling application to manage in-person room utilization during the COVID-19 pandemic featuring calendaring, approvals, notifications, etc. Used by over 800 employees during the return to hybrid work schedules. (PostgreSQL, RShiny, PostgREST, Office 365 APIs, Python)
- Identified and deployed an electronic lab notebook platform (ELN) for use by research staff at NIST. Developed data models for microbial research workflows and an automated experiment metadata validation and export pipeline. (LinkML, `pydantic`, Python, Web APIs)
- Co-chaired a working group of the Materials Research Data Alliance (MaRDA) focused on producing recommendations for the use of LIMS in materials research environments (results published in the *MRS Bulletin*)
- Maintain and manage community for open-source hyperspectral data analysis software – hyperspy/hyperspy (Python)

National Institute of Standards and Technology
Gaithersburg, MD

NRC Postdoctoral Research Fellow · Materials Measurement Science Division
October 2016 - September 2018

Independently developed research proposal (accepted by the National Research Council) to explore the applications of compressive sensing during 3D SEM imaging and chemical analysis in the FIB-SEM in order to radically improve experimental throughput

- Innovated the use of beta process factor analysis to enhance interpretability of chemical EDS maps (using Matlab and Python)
- Quantified hyperspectral reconstruction quality using multiple image quality metrics (*e.g.* SNR, DIVINE, BRISQUE, etc.)
- Regularly contributed development efforts to open-source hyperspectral data analysis software (*i.e. HyperSpy*)
- Collaboration with Dr. Keana Scott

University of Maryland
College Park, MD

NSF Graduate Research Fellow · Department of Materials Science and Engineering
July 2011 - August 2016

Research focused on development of electron and ion beam experimental and data processing methods to characterize various materials systems. Frequently collaborated with outside groups to train students on experimental equipment and data analysis to solve materials challenges

Analytical microscopy characterization of interfacial states at the 4H-*SiC/ SiO_2 interface:*

- Formulated an EELS data processing pipeline for research group, transitioning from one-off GUI-based analyses to Jupyter notebooks, dramatically enhancing data visualization, readability, and reproducibility
- Used high resolution TEM and electron energy loss spectroscopy to investigate the effects of post-processing on SiC MOSFETs
- Discovered unique electronic states of silicon in nitric oxide annealed devices using unsupervised machine learning EELS analyses
- Developed oxide spin-etching process with monolayer sensitivity for XPS depth profiling
- Collaboration with the U.S. Army Research Laboratory, Auburn University, and Rutgers University

Three-dimensional nanotomographic characterization of solid oxide fuel cell cathode degradation:

- Established FIB-SEM 3D methods to reconstruct SOFC cathode microstructures, collecting and processing over 10 GB of image data per experiment
- Developed innovative image processing and microstructure quantification routines using *Python*, *MATLAB*, and *Avizo*
- Quantified changes in SOFC cathode structures as a function of H_2O, CO_2, and Cr-vapor exposure
- Wrote a Python library to compute uncertainty confidence intervals for SOFC findings using a sub-volume bootstrapping algorithm
- Software implementations were open-sourced to enhance scientific reproducibility (*Repository Link*)
- Collaboration with Prof. Eric Wachsman

Cornell University
Ithaca, NY

Undergraduate Senior Thesis Research · Department of Materials Science and Engineering
August 2010 - May 2011

- Developed computational materials structure search methods using distributed high performance computing resources
- Discovered novel crystal structure of barium using genetic algorithm search techniques and density functional theory calculations
- Processed over 200GB of computation output using custom bash scripts
- Created descriptive visualizations of high-pressure solution space using *gnuplot*
- Awarded for "Best Overall Thesis" and 1st place in Senior Thesis poster competition by departmental faculty
- Advised by Asst. Prof. Richard Hennig (now at University of Florida)

Programming Side Projects

Fit File Faker
jat255/Fit-File-Faker – 29 stars

Python
2024

Tool to automatically process FIT workout activity files produced by various indoor bike training platforms to make them compatible with Garmin's web services

Zwift Click Handler
jat255/Zwift_click_handling – 35 stars

Python, Bluetooth LE
2024

Service to pair and receive button presses from the "Zwift Click" Bluetooth LE button. Involved reverse engineering of the Bluetooth LE protocol and translating button presses into simulated keyboard strokes for use in programs other than Zwift.

PackageMate *jat255/PackageMate – 100 stars*

React, MongoDB, Express.js, Node *2020*

Simple web app to centralize tracking of shipped packages by connecting various shipping service APIs (or scraping status webpages, where necessary) and presenting them in one coherent interface

Solar Data Logger *jat255/solar-inverter-datalogger*

Python, Bluetooth LE, InfluxDB, Grafana, Android Reverse Engineering *2021*

Service deployed on a Raspberry Pi Zero to extract real-time production data from my home's photovoltaic inverter via Bluetooth Low Energy communication. Data is logged to an InfluxDB time-series database, with visualizations and alerting built in a Grafana dashboard. This project was motivated by the lack of data provided by the system as-installed, so I reverse-engineered the vendor's Android application and built my own monitoring system that has been running for five years with minimal intervention.

Honors

Awards

Jul. 2023	**2023 MML Science Data Management and Capabilities Accolade**, NIST Materials Measurement Laboratory	*Boulder, CO*
Jul. 2021	**2021 Service and Support to MML Accolade**, NIST Materials Measurement Laboratory	*Boulder, CO*
Jul. 2020	**2020 MML Science Data Management and Capabilities Accolade**, NIST Materials Measurement Laboratory	*Boulder, CO*
Nov. 2016	**Graduate Student Award**, Materials Research Society Fall Meeting	*Boston, MA*
June 2015	**Materials Science Award**, University of Maryland ResearchFest	*College Park, MD*
June 2014	**Entrepreneurship Award**, University of Maryland NanoDay Competition	*College Park, MD*
Dec. 2013	**Outstanding Student Presentation**, Materials Research Society Fall Meeting	*Boston, MA*
May 2011	**First Place**, Cornell MS&E Senior Thesis Poster Competition	*Ithaca, NY*
May 2011	**Best Overall Thesis**, Cornell MS&E Senior Thesis Competition	*Ithaca, NY*

Fellowships & Grants

2021 - 2022	**Collaborating for Impact Now Program**, National Institute of Standards and Technology *Internal grant competition (∼$200k award – 6 awardees out of ∼100 applications)*	*Gaithersburg, MD*
2016 - 2018	**NRC Research Associateship**, National Research Council	*Gaithersburg, MD*
2013 - 2016	**Graduate Research Fellowship**, National Science Foundation	*College Park, MD*
2011 - 2016	**University Fellowship**, University of Maryland	*College Park, MD*
2010 - 2011	**MS&E Junior Fellowship**, Cornell University Department of Materials Science and Engineering	*Ithaca, NY*

Research Interests

Scientific Data Management	Applications of modern data science and engineering to real-world laboratory workflows through automation, interoperable data systems, and applications of artificial intelligence
Open-source Software	Bringing advanced data analysis methods to the scientific community through open-source software development, training, and collaboration
Community Schema Development	Convening scientific communities to form consensus on terminology, data models, and formal vocabularies to better enable FAIR and machine-actionable data in the physical sciences
Computational Microscopy	Novel applications of FIB-SEM and TEM methodologies and data processing for advanced materials analysis, bridging the gap between advanced signal processing and materials microscopy
Compressive Sensing	Speeding data collection and reducing electron dose through intelligent signal acquisition strategies
Autonomous Metrology	Improving microscopy data collection rates and results through intelligent (and autonomous) determination of measurement parameters using active learning
Machine Learning for Materials	Utilizing unsupervised methods to discover hidden relationships in hyperspectral datasets
Materials Research	Applying cutting edge characterization methodologies in a wide range of materials systems, including alternative energy, wide bandgap, and energy conversion materials

Teaching and Professional Experience

National Institute of Standards and Technology *Boulder, CO*

Materials Research Engineer · Office of Data and Informatics · Data Science Group *September 2016 - PRESENT*

- Certified *Software Carpentries* (SWC) instructor
- Lead annual introductory courses on Python, `bash`, `git`, R, and SQL for existing NIST staff and summer undergraduate research fellows
- Regularly lead tutorial short courses on the use of the HyperSpy python library for interactive data analysis at international conferences such as the annual *Microscopy and Microanalysis* meeting (typically ≈ 100 attendees)
- Invited to teach multiple data analysis courses at the Canadian Center for Electron Microscopy's Summer School program

Cornell University
Ithaca, NY

Undergraduate Teaching Assistant · Department of Computer Science
August 2008 - May 2011

- Teaching Assistant for CS 1110: Introduction to Computing Using Java and CS 1130: Transition to Object Oriented Programming
- Led weekly laboratory sessions of thirty students
- Assisted students during weekly office hours, answering questions and administering quizzes
- Graded weekly assignments and communicated detailed student feedback for every submission
- Courses included engineering and liberal arts students, requiring effective communication across multiple disciplines

Amphenol PCD
Beverly, MA

Industrial Engineering Co-op
Fall 2009; Summer 2010

- Worked closely with the Industrial Engineering Manager to bring new industrial connector products to the market
- Led the design of a custom telecommunications connector, proposing designs and tweaking the product to meet the customer's needs
- Supervised manufacturing staff during the initial quantity production of the new product; designed manufacturing work instructions
- Designed 3D models and engineering drawings for industrial and military/aerospace product lines
- Supported the Industrial Marketing and Sales Manager as an engineering representative in customer interactions

Professional Affiliations

Microanalysis Society

Computer Activities Committee Chair (appointed) — *2024 - PRESENT*
Executive Council Director (elected) — *2021-2023*
Member — *2015 - PRESENT*

Materials Research Society

Member — *2012 - PRESENT*

Research Data Alliance

Member — *2018 - PRESENT*

Publications

Research productivity

Summary statistics:

- 11 published peer-reviewed articles; 13 conference proceedings
- 21 invited presentations; 33 contributed presentations
- 712 unique citations; *h*-index: 11

Refereed Journal Articles (11)

MaRDA FAIR Materials Microscopy and LIMS Working Groups' Community Recommendations
Joshua A. Taillon, Edward Barnard, Laura M. Bartolo, Maria K. Y. Chan, Eric A. Stach, Mitra L. Taheri, L. Catherine Brinson, Peter W. Voorhees
MRS Bulletin, in press, 2025.

ETSpy: A HyperSpy extension package for electron tomography data processing and reconstruction
Andrew A. Herzing, Joshua A. Taillon
Micron, vol. 190, p. 103774, 2025. DOI: 10.1016/j.micron.2024.103774

NexusLIMS: A Laboratory Information Management System for Shared-Use Electron Microscopy Facilities
Joshua A. Taillon, Thomas F. Bina, Raymond L. Plante, Marcus W. Newrock, Gretchen Greene, June W. Lau
Microscopy and Microanalysis, vol. 26, no. 3, pp. 511–527, 2021. DOI: 10.1017/S1431927621000222

Characterization of Zinc Carboxylates in an Oil Paint Test Panel
Christine Romano, Thomas Lam, G Asher Newsome, Joshua A. Taillon, Nicole Little, Jia-sun Tsang
Studies in Conservation, 2019. DOI: 10.1080/00393630.2019.1666467

Analysis of the electronic and chemical structure in boron and phosphorus passivated 4H-SiC/SiO_2 interfaces using HRTEM and STEM-EELS
Joshua A. Taillon, Christopher Klingshirn, Sarit Dhar, Tsvetanka S. Zheleva, Aivars J. Lelis, Lourdes G. Salamanca-Riba
Applied Physics Letters, 2018. DOI: 10.1063/1.5053595

Improving microstructural quantification in FIB/SEM nanotomography
Joshua A. Taillon, Christopher Pellegrinelli, Yilin Huang, Eric D. Wachsman, Lourdes G. Salamanca-Riba
Ultramicroscopy, vol. 184, pp. 24–38, 2018. DOI: 10.1016/j.ultramic.2017.07.017

Teaching an Old Material New Tricks: Easy and Inexpensive Focused Ion Beam (FIB) Sample Protection Using Conductive Polymers
Joshua A. Taillon, Valery Ray, Lourdes G. Salamanca-Riba
Microscopy and Microanalysis, vol. 23, no. 4, pp. 872–877, 2017. DOI: 10.1017/S143192761700054X

Near-Field Optical Properties of Fully Alloyed Noble Metal Nanoparticles
Chen Gong, Mariama Rebello Sousa Dias, Garrett C. Wessler, Joshua A. Taillon, Lourdes G. Salamanca-Riba, Marina S. Leite
Advanced Optical Materials, vol. 5, no. 1, p. 1600568, 2016. DOI: 10.1002/adom.201600568

Long-Term Cr Poisoning Effect on LSCF-GDC Composite Cathodes Sintered at Different Temperatures
Chunyan Xiong, Joshua A. Taillon, Christopher Pellegrinelli, Yi-Lin Huang, Lourdes G. Salamanca-Riba, Bo Chi, Li Jian, Jian Pu, Eric D. Wachsman

Journal of The Electrochemical Society, vol. 163, no. 9, F1091–F1099, 2016. DOI: 10.1149/2.0841609jes

Boron-doped few-walled carbon nanotubes: novel synthesis and properties
Colin Preston, Da Song, Joshua A. Taillon, John Cumings, Liangbing Hu
Nanotechnology, vol. 27, no. 44, p. 445601, 2016. DOI: 10.1088/0957-4484/27/44/445601

Systematic structural and chemical characterization of the transition layer at the interface of NO-annealed 4H-SiC/SiO_2 metal-oxide-semiconductor field-effect transistors
Joshua A. Taillon, Joon Hyuk Yang, Claude A. Ahyi, John Rozen, John R. Williams, Leonard C. Feldman, Tsvetanka S. Zheleva, Aivars J. Lelis, Lourdes G. Salamanca-Riba
Journal of Applied Physics, vol. 113, no. 4, p. 044517, 2013. DOI: 10.1063/1.4789924

Conference Proceedings (13)

Euclid-NexusLIMS: A Customizable Data Management Software for Microscopists with Cloud Computing Outlook
Ao Liu, Weinan Si, June Lau, Joshua A. Taillon, Roberto Reis, Laura Bartolo
Microscopy and Microanalysis, vol. 28, no. S1, pp. 3044–3045, 2022. DOI: 10.1017/S1431927622011369

Lessons Learned in Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon
Microscopy and Microanalysis, vol. 28, no. S1, pp. 2912–2913, 2022. DOI: 10.1017/S1431927622010923

NexusLIMS: Leveraging Shared Microscopy Resources for Data Analysis with a Configurable Laboratory Information Management System
Joshua A. Taillon, Raymond L. Plante, Marcus W. Newrock, June W. Lau, Gretchen Greene
Microscopy and Microanalysis, vol. 26, no. S2, pp. 140–141, 2020. DOI: 10.1017/S1431927620023314O

Harvesting Microscopy Experimental Context with a Configurable Laboratory Information Management System
Joshua A. Taillon, Rachel F. Devers, Raymond L. Plante, Marcus W. Newrock, June W. Lau, Gretchen Greene
Microscopy and Microanalysis, vol. 25, no. S2, pp. 140–141, 2019. DOI: 10.1017/S1431927619001430

An Open Evaluation of Hyperspectral Unmixing Strategies for EDS Analysis
Joshua A. Taillon
Microscopy and Microanalysis, vol. 24, no. S1, pp. 752–753, 2018. DOI: 10.1017/S1431927618004257

Compressive Sensing Reconstruction for EDS Analysis
Joshua A. Taillon
Microscopy and Microanalysis, vol. 24, no. S1, pp. 486–487, 2018. DOI: 10.1017/S1431927618002921

Electron Microscopy (Big and Small) Data Analysis With the Open Source Software Package HyperSpy
Francisco Pena, Tomas Ostasevicius, Vidar Tonaas Fauske, Pierre Burdet, Petras Jokubauskas, Magnus Nord, Mike Sarahan, Eric Prestat, Duncan N. Johnstone, Joshua A. Taillon, al.
Microscopy and Microanalysis, vol. 23, no. S1, pp. 214–215, 2017. DOI: 10.1017/S1431927617001751

Three Dimensional Microstructural Characterization of Cathode Degradation in SOFCs Using FIB/SEM and TEM
Joshua A. Taillon, Christopher Pellegrinelli, Yilin Huang, Eric D. Wachsman, Lourdes G. Salamanca-Riba
Microscopy and Microanalysis, vol. 21, no. S3, pp. 2161–2162, 2015. DOI: 10.1017/S1431927615011587

Characterization of the Oxide-Semiconductor Interface in 4H-SiC/SiO_2 Structures using TEM and XPS
Joshua A. Taillon, Karen Gaskell, Gang Liu, Leonard C. Feldman, Sarit Dahr, Tsvetanka S. Zheleva, Aivars J. Lelis, Lourdes G. Salamanca-Riba
Microscopy and Microanalysis, vol. 21, no. S3, pp. 1537–1538, 2015.

Investigating the Relationship between Operating Conditions and SOFC Cathode Degradation
Christopher Pellegrinelli, Yi-Lin Huang, Joshua A. Taillon, Lourdes G. Salamanca-Riba, Eric D. Wachsman
ECS Transactions, vol. 68, no. 1, pp. 773–784, 2015. DOI: 10.1149/06801.0773ecst

A Study of SOFC Cathode Degradation in H_2O Environments
Christopher Pellegrinelli, Yi-Lin Huang, Joshua A. Taillon, Lourdes G. Salamanca-Riba, Eric D. Wachsman
ECS Transactions, vol. 64, no. 2, pp. 17–28, 2014. DOI: 10.1149/06402.0017ecst

Towards a fundamental understanding of the cathode degradation mechanisms
Eric D. Wachsman, Yi-Lin Huang, Christopher Pellegrinelli, Joshua A. Taillon, Lourdes G. Salamanca-Riba
ECS Transactions, vol. 61, no. 1, pp. 47–56, 2014. DOI: 10.1149/06101.0047ecst

Three Dimensional Microstructural Characterization of Cathode Degradation in SOFCs Using Focused Ion Beam and SEM
Joshua A. Taillon, Christopher Pellegrinelli, Yilin Huang, Eric D. Wachsman, Lourdes G. Salamanca-Riba
ECS Transactions, vol. 61, no. 1, pp. 109–120, 2014. DOI: 10.1149/06101.0109ecst

Other Publications (7)

NSF FAIROS Materials Research Data Alliance Working Groups to hold Town Hall Meeting at 2024 MRS Spring Meeting & Exhibit
Edward S. Barnard, Maria K. Y. Chan, Eric A. Stach, Joshua A. Taillon, al.
MRS Bulletin, vol. 49, no. 3, pp. 285–286, 2024. DOI: 10.1557/s43577-024-00676-y

A Roadmap for LIMS at NIST Material Measurement Laboratory
Gretchen Greene, Jared Ragland, Zachary Trautt, June Lau, Raymond Plante, Joshua A. Taillon, al.
NIST Technical Note, TN 2216, 2022. DOI: 10.6028/NIST.TN.2216

NexusLIMS: a Python Package for EM Experiment Metadata Management
Joshua A. Taillon
NIST Public Data Repository, 2021. DOI: 10.18434/mds2-2355

Nexus-Experiment: an XML schema for describing data collected from electron microscopes
Raymond L. Plante, Joshua A. Taillon, June W. Lau, Gretchen Greene, Marcus Newrock

NIST Public Data Repository, 2020. DOI: 10.18434/M32245

Characterization of Zinc Carboxylates in an Oil Paint Test Panel [dataset]
Christine Romano, Thomas Lam, G Asher Newsome, Joshua A. Taillon, Nicole Little, Jia-sun Tsang
NIST Public Data Repository, 2019. DOI: 10.18434/M32082

Advanced Analytical Microscopy at the Nanoscale: Applications in Wide Bandgap and Solid Oxide Fuel Cell Materials
Joshua A. Taillon
Ph.D. Thesis, 2016. DOI: 10.13016/m29806

Ab Initio Discovery of Novel Crystal Structure Stability in Barium and Sodium-Calcium Compounds under Pressure using DFT
Joshua A. Taillon, William W. Tipton, Richard G. Hennig
arXiv e-prints, 2012. arxiv: https://arxiv.org/abs/1207.3320

Presentations

Invited (21)

An update from the MaRDA LIMS Working Group
Joshua A. Taillon, Eric Stach, *et al.* — *Virtual*
Invited talk at the *2024 MaRDA Virtual Annual Meeting* — *Feb. 2024*

Lessons Learned Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon — *Munich, Germany*
Invited talk at the *Leibniz Supercomputing Centre* (Germany) — *Oct. 2023*

Introducing the MaRDA LIMS Working Group: LIMS Schema Development
Joshua A. Taillon — *Salzburg, Austria*
Invited talk at the *21st RDA Plenary Session* — *Oct. 2023*

Lessons Learned Evaluating and Deploying Electronic Laboratory Notebooks at NIST
Joshua A. Taillon — *Virtual (Munich, Germany)*
Invited talk at the *Leibniz Supercomputing Centre* (Germany) — *Sept. 2023*

An Overview of the NIST Microscopy Data Ecosystem
Joshua A. Taillon — *Evanston, IL*
Poster presented at *MaRDA Working Group Meeting* — *May 2023*

Overview of NexusLIMS Usage and Development
Joshua A. Taillon — *Evanston, IL*
Invited talk at *Northwestern University* — *May 2023*

Lessons Learned Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon — *Denver, CO*
Invited talk at the *U.S. Geological Survey* — *Oct. 2022*

Lessons Learned Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon — *Virtual (Madison, WI)*
Invited talk at *University of Wisconsin – Madison* — *Oct. 2022*

Lessons Learned Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon — *Virtual (Richland, WA)*
Invited talk at *Pacific Northwest National Laboratory* — *Sept. 2022*

Lessons Learned in Building a Modern Microscopy Data Infrastructure at NIST
Joshua A. Taillon — *Portland, OR*
Invited talk at the *2022 Microscopy and Microanalysis Meeting* — *Aug. 2022*

Data Analysis in Materials Science
Joshua A. Taillon, Carter Francis — *Portland, OR*
8-hour Sunday Short Course presented at the *2022 Microscopy and Microanalysis Meeting* — *July 2022*

Open-source hyper-dimensional materials analytics using HyperSpy
Joshua A. Taillon — *Virtual*
Invited talk at the *2021 MS&T Meeting* — *Oct. 2021*

Data Analysis in Materials Science
Joshua A. Taillon, Eric Prestat, Carter Francis, Håkon Wiik Ånes — *Virtual*
8-hour Sunday Short Course presented at the *2021 Microscopy and Microanalysis Meeting* — *Aug. 2021*

Data Analysis in Materials Science
Joshua A. Taillon, Eric Prestat, Duncan Johnstone, Magnus Nord, Katherine MacArthur — *Portland, OR*
8-hour Sunday Short Course presented at the *2019 Microscopy and Microanalysis Meeting* — *Aug. 2019*

Electron Microscopy in the Age of "*Big Data*"
Joshua A. Taillon — *Hamilton, ON, Canada*
Presented at the *2019 Canadian Center for Electron Microscopy Summer School* — *June 2019*

Applications of Compressive Sensing for EDS Analysis
Joshua A. Taillon — *Hamilton, ON, Canada*
Presented at the *2018 FIB/SEM User Group Meeting* — *May 2018*

An Introduction to HyperSpy: the Multi-dimensional Data Analysis Toolbox

Joshua A. Taillon, Andrew A. Herzing — *Gaithersburg, MD*
A tutorial presented at the *Tools for Electron Microscopists* session at NIST — *Apr. 2018*

Computational Frontiers in Microscopy and Microanalysis
Joshua A. Taillon — *Gaithersburg, MD*
Presented at *A Celebration of Microscopy and Microanalysis* — *Sept. 2017*

Compressed Sensing Applications in Microscopy and Microanalysis
Joshua A. Taillon — *Gaithersburg, MD*
Presented at the *NIST CS-Bio-Metrology Working Group Meeting* — *May 2017*

Analytical and Microstructural Microscopy Approaches for Materials Characterization
Joshua A. Taillon — *Adelphi, MD*
Presented at the *U.S. Army Research Laboratory Methodology Seminar Series* — *Dec. 2016*

Analytical Electron Microscopy of Interfacial States in 4H-SiC/SiO_2 MOS Devices
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented for Graduate Student Award consideration at the *2016 Fall Materials Research Society Meeting* — *Nov. 2016*

Contributed (33)

HyperSpy: Your Multidimensional Data Analysis Toolbox
Joshua A. Taillon — *Tacoma, WA*
Presentation at *SciPy 2024* — *July 2024*

Updates from the MaRDA LIMS Working Group – A Community Discussion
Joshua A. Taillon, Eric Stach, *et al.* — *Seattle, WA*
Town Hall forum presented at the *2024 Spring Materials Research Society Meeting* — *Apr. 2024*

NexusLIMS: Leveraging Shared Microscopy Resources for Data Analysis with a Configurable Laboratory Information Management System
Joshua A. Taillon — *Virtual*
Presented at the *2020 Microscopy and Microanalysis Meeting* — *Aug. 2020*

Harvesting Microscopy Experimental Context with a Configurable Laboratory Information Management System
Joshua A. Taillon — *Portland, OR*
Presented at the *2019 Microscopy and Microanalysis Meeting* — *Aug. 2019*

Compressive Sensing Reconstruction for EDS Analysis
Joshua A. Taillon — *Baltimore, MD*
Presented at the *2018 Microscopy and Microanalysis Meeting* — *Aug. 2018*

An Open Evaluation of Hyperspectral Unmixing Strategies for EDS Analysis
Joshua A. Taillon — *Baltimore, MD*
Presented at the *2018 Microscopy and Microanalysis Meeting* — *Aug. 2018*

TEM-EELS Investigation of Boron and Phosphorus Passivated 4H-SiC/SiO_2 Interface Structures
Christopher Klingshirn, Joshua A. Taillon, *et al.* — *New Orleans, LA*
Presented at the *2017 March American Physical Society Meeting* — *Mar. 2017*

Quantifiable Comparative Evaluation of FIB/SEM Instruments
Valery Ray, Joshua A. Taillon, *et al.* — *Gaithersburg, MD*
Presented at the *2017 FIB/SEM User Group Meeting* — *Mar. 2017*

Analytical Electron Microscopy of Interfacial States in 4H-SiC/SiO_2 MOS Devices
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2016 Fall Materials Research Society Meeting* — *Nov. 2016*

Advanced Analytical Microscopy at the Nanoscale: Applications in Wide Bandgap and Solid Oxide Fuel Cell Materials
Joshua A. Taillon — *College Park, MD*
Oral defense of Ph.D. Thesis — *July 2016*

Performance and Degradation of SOFC Cathodes at Reduced Temperature
Christopher Pellegrinelli, Joshua A. Taillon, *et al.* — *San Diego, CA*
Presented at the *2016 Spring Electrochemical Society Meeting* — *May 2016*

Revealing Hidden Interfacial States in NO Passivated 4H-SiC/SiO_2 Structures using TEM-EELS and XPS
Joshua A. Taillon, *et al.* — *Baltimore, MD*
Presented at the *2016 March American Physical Society Meeting* — *Mar. 2016*

Alloyed Noble Metal Nanoparticles with Tunable Optical Properties
Garrett C. Wessler, Joshua A. Taillon, *et al.* — *Baltimore, MD*
Presented at the *2016 March American Physical Society Meeting* — *Mar. 2016*

Probing the Nature of Interfacial States in NO Passivated 4H-SiC/SiO_2 Structures using TEM-EELS and XPS
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2015 Fall Materials Research Society Meeting* — *Dec. 2015*

Tomographic and Hyperspectral Analysis of Porous Three-Dimensional Solid Oxide Fuel Cell Cathodes at Multiple Length Scales
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2015 Fall Materials Research Society Meeting* — *Nov. 2015*

Characterization of the Oxide-Semiconductor Interface in 4H-SiC/SiO_2 MOS Structures Using TEM and XPS
Joshua A. Taillon, *et al.* — *College Park, MD*
Presented at the *10th Annual SiC MOS Program Review* — *Aug. 2015*

Characterization of the Oxide-Semiconductor Interface in 4H-SiC/SiO_2 Structures Using TEM and XPS
Joshua A. Taillon, *et al.* — *Portland, OR*
Presented at the *2015 Microscopy and Microanalysis Meeting* — *Aug. 2015*

Three Dimensional Microstructural Characterization of Cathode Degradation in SOFCs Using FIB/SEM and TEM
Joshua A. Taillon, *et al.* — *Portland, OR*
Presented at the *2015 Microscopy and Microanalysis Meeting* — *Aug. 2015*

Investigating the Relationship between Operating Conditions and SOFC Cathode Degradation
Christopher Pellegrinelli, Joshua A. Taillon, *et al.* — *Glasgow, Scotland*
Presented at the *2015 SOFC-XIV Electrochemical Society Conference on Electrochemical Energy Conversion and Storage* — *July 2015*

Three Dimensional Microstructural Characterization of SOFCs Using Focused Ion Beam and SEM
Joshua A. Taillon, *et al.* — *Laurel, MD*
Presented at the *2015 FIB/SEM User Group Meeting* — *Feb. 2015*

Characterization of the Oxide-Semiconductor Interface in 4H-SiC/SiO_2 Structures Using TEM and XPS
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2014 Fall Materials Research Society Meeting* — *Dec. 2014*

Three Dimensional Microstructural Characterization of Cathode Degradation in SOFCs Using Focused Ion Beam and SEM
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *Americas Amira & Avizo User Group Meeting* — *Oct. 2014*

Characterization of the Oxide-Semiconductor Interface in 4H-SiC/SiO_2 Structures Using TEM and XPS
Joshua A. Taillon, *et al.* — *College Park, MD*
Presented at the *9th Annual SiC MOS Workshop* — *Aug. 2014*

Three Dimensional Microstructural Characterization of Cathode Degradation in SOFCs Using Focused Ion Beam and SEM
Joshua A. Taillon, *et al.* — *Orlando, FL*
Presented at the *2014 Spring Electrochemical Society Meeting* — *May 2014*

Characterization of the Oxide-Semiconductor Interface in NO, P, and N-plasma Passivated 4H-SiC/SiO_2 Structures Using TEM and XPS
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2013 Fall Materials Research Society Meeting* — *Dec. 2013*

Characterization of the Oxide-Semiconductor Interface in NO, P, and N-plasma Passivated 4H-SiC/SiO_2 Structures Using TEM
Joshua A. Taillon, *et al.* — *College Park, MD*
Presented at the *8th Annual SiC MOS Workshop* — *Aug. 2013*

Characterization of the Oxide-Semiconductor Interface in NO, P, and N-Plasma Passivated 4H-SiC/SiO_2 Structures Using TEM
Joshua A. Taillon, *et al.* — *South Bend, IN*
Presented at the *55th Electronic Materials Conference* — *June 2013*

Characterization of the oxide-semiconductor transition layer in NO, P, and N-plasma passivated 4H-SiC/SiO_2 structures using transmission electron microscopy
Joshua A. Taillon, *et al.* — *Baltimore, MD*
Presented at the *2013 March American Physical Society Meeting* — *Mar. 2013*

Systematic Characterization of the SiC/SiO_2 Transition Layer in NO-Annealed MOSFETs
Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2012 Fall Materials Research Society Meeting* — *Nov. 2012*

Fabrication of ZnO Nanowire Arrays for Hybrid Photovoltaic Applications
Joshua A. Taillon, *et al.* — *Boston, MA*
Poster presented at the *2012 Fall Materials Research Society Meeting* — *Nov. 2012*

Systematic Characterization of the SiC/SiO_2 Transition Layer in NO-Annealed MOSFETs
Joshua A. Taillon, *et al.* — *College Park, MD*
Presented at the *7th Annual SiC MOS Workshop* — *Aug. 2012*

Fabrication of ZnO Nanowire Arrays for Hybrid Photovoltaic Applications
Lourdes Salamanca-Riba, Joshua A. Taillon, *et al.* — *Boston, MA*
Presented at the *2012 Fall American Physical Society March Meeting* — *Feb. 2012*

Ab Initio Discovery of Novel Crystal Structure Stability in Barium and Sodium-Calcium Compounds under Pressure using DFT
Joshua A. Taillon, *et al.* — *Ithaca, NY*
Presented at the *2011 Cornell University Senior Research Thesis Symposium* — *May 2011*