

# Adam Scott Christensen

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## Skills and Qualifications

- Public speaking and presentations
  - Advanced academic and professional writing ability
  - Group management
  - Innovative problem solving and diligent work ethic
  - Computer Programming: 9+ years of experience with Python, MATLAB, LabView, and C++
  - 7+ years of experience in cleanrooms and high-vacuum systems and device fabrication
  - Foreign Language: Japanese (near-native fluency), 3 years of experience translating Japanese Patents and IP
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## Education

**The University of Texas at Austin, Austin, TX** *May 2025*  
Doctor of Philosophy in Experimental Condensed Matter Physics  
Dissertation: **Fabrication and Characterization of Thin Film Devices for Use in Neuromorphic Computing**

**Brigham Young University, Provo, UT** *2013 – 2019*  
Bachelor of Science in Physics  
Minors: Mathematics and Japanese

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## Research Experience

**Graduate Intern** *Jul. 2024 – Present*  
Sandia National Labs, Albuquerque, NM  
Advisor: Albert Alec Talin  
**-Expertise in transition metal oxide-based electrochemical random-access memory (ECRAM) device fabrication, characterization, programming, state retention, device endurance tests** using semiconductor device parameter analyzers and vacuum probe stations.

**DOE SCGSR Fellow** *Jul. 2023 – Jul. 2024*  
Sandia National Labs, Albuquerque, NM  
Advisor: Albert Alec Talin  
**- Expertise in fabricating nanoscale structures by electron beam lithography** down to **30 nm** for use in ECRAM, molecular memristors, and Mott-activated neurons.  
**- Developed fabrication processes and metrological skills for integrated circuits on 100 mm wafers** using design-of-experiments, photolithography and metal liftoff,

deposition techniques: atomic layer deposition (ALD), chemical vapor deposition (CVD), and evaporation, *dry etching* techniques: reactive ion etching (RIE) and inductively coupled plasma (ICP) etching, *wet etching* techniques: hydrogen fluoride (HF), hydrogen chloride (HCl), and chromium etch. *Film characterization* by scanning electron microscopy (SEM), atomic force microscopy (AFM), profilometry, ellipsometry, reflectometry, four-point-probe measurements, and cyclic voltammetry measurements.

- Performed research while adhering to **DOE Environmental Health & Safety (ES&H) regulations**
- **Implemented statistical process controls to improve EBL device yield from 15% to 90%**

### **Condensed Matter Graduate Research Assistant**

*Sept. 2020 – May 2025*

The University of Texas at Austin, Austin, TX

Advisor: Alexander Demkov

- **Expertise in thin film deposition using RF magnetron sputtering** of materials used in integrated silicon photonics and neuromorphic computing, namely strontium barium niobate (SBN) for integrated silicon photonics and vanadium dioxide (VO<sub>2</sub>) in memristor-based neuromorphic computing and ECRAM.
- **Developed metrological skills** including film characterization using x-ray photoelectron spectroscopy (XPS), x-ray diffraction (XRD), cryo-focused ion beam (FIB) lamella preparation for use in transmission electron microscopy (TEM), SEM, and AFM.

### **Condensed Matter Research Assistant**

*May 2019 – Aug. 2019*

Brigham Young University REU, Provo, UT

Advisor: Karine Chesnel

- **Diagnosed issues** with a previously constructed surface magneto-optic Kerr effect (SMOKE) magnetometer designed to graphically record the net magnetization of cobalt platinum (Co-Pt) multilayers per applied magnetic field in characteristic hysteresis loops.
- **Estimated the effective Kerr rotation** that occurs when linearly polarized light is reflected off the surface of a Co-Pt multilayer with net magnetization.

### **Nuclear Physics Research Assistant**

*Feb. 2018 – Aug. 2019*

Brigham Young University, Provo, UT

Advisor: Lawrence Rees

- **Explored the optical viability of a new geometry of neutron detector** by experimentally and theoretically testing how much light would be attenuated inside the detector.
- **Designed a physical model of the detector** using acrylic disks immersed in mineral oil to simulate a detector with similar indices of refraction and geometries.
- **Manufactured acrylic** disks infused with gadolinium-isopropoxide which scintillate upon collision with incident neutrons.
- **Presented results at a BYU Student Research Conference** and in a senior thesis.

### **Acoustics Research Assistant**

*Sept. 2017 – Jan. 2018*

Brigham Young University, Provo, UT

Advisor: Timothy Leishman

- Performed research on a real-time convolution system, a kind of linear time-invariant system, which predicted the varying amount of vocal stress experienced by speakers in different acoustic environments such as a classroom or large auditorium.
- **Calibrated and ran a complex MATLAB program** which convoluted impulse responses from various types of rooms with a test subject's vocal signal and sent the resulting signal back to the subject in real time, creating the impression that they were speaking in the chosen test room.
- **Analyzed experimental data using MATLAB**, and an emphasis in experimental methods (e.g. equipment calibration, data acquisition, analysis, presentation).

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## Extracurricular and Volunteer Experience

### Physics Outreach Volunteer

*Sept. 2020 – May 2025*

UT Physics Circus, Austin, TX

- Virtually present introductory Physics concepts in mechanics, electricity and magnetism, and thermodynamics to children in a tractable 30-minute presentation on a weekly/biweekly basis.
- Develop collaboration, communication, and organizational ability with the other graduate students participating in the program.

### Full - Time Volunteer

*2014 – 2016*

Church of Jesus Christ of Latter-Day Saints

Tokyo, Japan

- Held weekly and daily planning meetings with partner to review past goals, evaluate progress, set new goals, and outline plans for achieving those goals.
- Held leadership positions over groups of 8 to 40 individuals and was responsible for giving weekly and monthly training presentations, leading and recording group goal setting, managing conflicts, and leading by example in diligence and excellence.
- Simultaneously balanced study of language and culture while assisting others in achieving personal goals, addiction recovery, and development of personal character and accountability.

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## Conferences

### APS March Meeting 2024

A. Christensen, M. Reynaud, A. B. Posadas, X. Zhan, J. H. Warner, A. A. Demkov; “Electro-optic effect in thin film strontium barium niobate (SBN) grown by RF magnetron sputtering on SrTiO<sub>3</sub> substrates”

### APS March Meeting 2023

Adam S. Christensen, Agham B. Posadas, Brian T. Zutter, Albert A. Talin, Alexander A. Demkov, “Effect of substrate and growth method on vanadium dioxide thin films by RF magnetron sputtering”

### **PCSI 48<sup>th</sup> Conference 2023**

A. S. Christensen, A. B. Posadas, B. Zutter, P. Finnegan, S. Bhullar, A. A. Talin, A. A. Demkov, "Effect of substrate and growth method on vanadium dioxide thin films by RF magnetron sputtering"

### **APS March Meeting 2022**

A Christensen, A Posadas, AA Talin, A Demkov, "Novel method of thin-film vanadium dioxide growth on (100)-oriented YSZ substrate using RF magnetron sputtering," Bulletin of the American Physical Society, 2022

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## **Publications**

A. L. Gross, S. Oh, W. Hodges, A. S. Christensen et al, "Electro-thermo-chemical random-access memory enables thousands of precision resistance states stored across six decades of dynamic range", *in prep* (2025).

S. Oh, A. L. Gross, A. S. Christensen et al, "Electrochemically Stabilized Phase Coexistence for Scalable Storage and Processing of Information, *in prep* (2025).

A. Christensen, M. Reynaud, A. B. Posadas, X. Zhan, J. H. Warner, A. A. Demkov, "Electro-optic effect in thin film strontium barium niobate (SBN) grown by RF magnetron sputtering on SrTiO<sub>3</sub> substrates," Journal of Applied Physics 136, 013102 (2024).

A. Christensen, A. B. Posadas, B. Zutter, P. Finnegan, S. Bhullar, S. Bishop, A. A. Talin, A. A. Demkov, "Effect of substrate and growth method on vanadium dioxide thin films by RF magnetron sputtering: Vanadium metal oxidation vs reactive sputtering," Journal of Applied Physics 134, 015301 (2023).

A. Posadas, S. Kwon, A. Christensen, M. J. Kim, A. Demkov, "Facile growth of epitaxial vanadium monoxide on SrTiO<sub>3</sub> via substrate oxygen scavenging," Journal of Vacuum Science & Technology A 40, 1 (2022).

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## **Honors and Awards:**

*Spring 2023* – Department of Energy SCGSR Fellowship

*2018 – Present* Phi Kappa Phi, Honor Society

*2017* – BYU Full Tuition Scholarship (Spring/Summer)

*2017, 2014* – College of Physical and Mathematical Sciences Dean's List

*2016* – Golden Key International, Honor Society

*2013* – Heritage Scholarship

*2013* – Phi Eta Sigma, Honor Society