

# Joshua A. Taillon

MATERIALS RESEARCH ENGINEER · CHARACTERIZATION EXPERT

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## Current Appointment

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### National Institute of Standards and Technology

NRC POSTDOCTORAL RESEARCH FELLOW · MATERIALS MEASUREMENT SCIENCE DIVISION

Gaithersburg, MD

October 2016 - PRESENT

## Education

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### University of Maryland, College Park

PH.D./M.S. IN MATERIALS SCIENCE AND ENGINEERING

- 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

College Park, MD

August 2016/May 2014

### Cornell University

B.S. IN MATERIALS SCIENCE AND ENGINEERING

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

Ithaca, NY

June 2011

## Skills

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<b>Materials Characterization</b>	Extensive experience with FIB (Ga <sup>+</sup> /Xe <sup>+</sup> ), SEM, TEM, Nanotomography, EDS, EELS, XPS, EBSD, XRD, etc.
<b>Scientific Programming</b>	Python, Matlab, Java, Bash scripting, Mathematica, LaTeX
<b>Materials Processing</b>	Wet etching, Chemical vapor deposition, Electron beam evaporation
<b>Software Skills</b>	<i>Microscopy</i> : HyperSpy, DigitalMicrograph, ImageJ, Avizo, etc.; <i>Crystallography</i> : VESTA, CrystalMaker, JMol; <i>Energy Simulation</i> : VASP, Gaussian, ELK, Quantum Espresso; <i>Productivity</i> : All common office tools, extensive experience using Linux/BSD command line environments

## Research Experience

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### National Institute of Standards and Technology

NRC POSTDOCTORAL RESEARCH FELLOW · MATERIALS MEASUREMENT SCIENCE DIVISION

- Exploring the application of compressive sensing to enhance throughput during 3D imaging and chemical analysis in the FIB-SEM
- Contributing development to open-source hyperspectral data analysis software (*HyperSpy*)
- Collaboration with Dr. Keana Scott

Gaithersburg, MD

October 2016 - PRESENT

### University of Maryland

NSF GRADUATE RESEARCH FELLOW · DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

- Thesis focused on development and use of electron and ion beam methods to characterize various materials systems
- Frequently collaborated with outside research groups to train students and solve assorted analysis challenges
- Advised by Prof. Lourdes Salamanca-Riba

College Park, MD

July 2011 - August 2016

*Analytical microscopy characterization of interfacial states at the 4H-SiC/SiO<sub>2</sub> interface:*

- Used high resolution TEM and electron energy loss spectroscopy to investigate the effects of post-processing on SiC MOSFETs
- Implemented novel EELS methodologies to probe the nature of the interfacial transition layer in SiC MOS devices
- 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:*

- Used FIB-SEM 3D tomography methods to reconstruct and probe SOFC cathode microstructures
- Developed innovative image processing and microstructure quantification routines using *Python* and *Avizo*
- Quantified changes in SOFC cathode structures as a function of H<sub>2</sub>O, CO<sub>2</sub>, and Cr-vapor exposure
- Collaboration with Prof. Eric Wachsman

### Cornell University

UNDERGRADUATE SENIOR THESIS RESEARCH · DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

- Computational search for high temperature superconductors in elemental barium and sodium-calcium phases under high pressure
- Discovered novel crystal structure of barium using genetic algorithm search techniques and density functional theory calculations
- Awarded for best overall thesis and best research poster presentation; Advised by Asst. Prof. Richard Hennig (now at University of Florida)

Ithaca, NY

August 2010 - May 2011

## Honors

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### FELLOWSHIPS & GRANTS

2016 - 2018	<b>NRC Research Associateship</b> , National Research Council	Gaithersburg, MD
2013 - 2016	<b>Graduate Research Fellowship</b> , National Science Foundation	College Park, MD
2011 - 2016	<b>University Fellowship</b> , University of Maryland	College Park, MD
2010 - 2011	<b>MS&amp;E Junior Fellowship</b> , Cornell University Department of Materials Science and Engineering	Ithaca, NY

### AWARDS

Nov. 2016	<b>Graduate Student Award</b> , Materials Research Society Fall Meeting	Boston, MA
June 2015	<b>Materials Science Award</b> , University of Maryland ResearchFest	College Park, MD
June 2014	<b>Entrepreneurship Award</b> , University of Maryland NanoDay Competition	College Park, MD
Dec. 2013	<b>Outstanding Student Presentation</b> , Materials Research Society Fall Meeting	Boston, MA
May 2011	<b>First Place</b> , Cornell MS&E Senior Thesis Poster Competition	Ithaca, NY
May 2011	<b>Best Overall Thesis</b> , Cornell MS&E Senior Thesis Competition	Ithaca, NY

## Research Interests

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<b>Computational Microscopy</b>	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
<b>Compressive Sensing</b>	Speeding data collection and reducing electron dose through intelligent signal acquisition strategies
<b>Autonomous Metrology</b>	Improving microscopy data collection rates and results through intelligent (and autonomous) determination of measurement parameters using active learning
<b>Machine Learning for Materials</b>	Utilizing unsupervised methods to discover hidden relationships in hyperspectral datasets
<b>Open-source Development</b>	Bringing advanced data analysis methods to the microscopy community through open-source software collaborations
<b>Materials Research</b>	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

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### Cornell University

UNDERGRADUATE TEACHING ASSISTANT · DEPARTMENT OF COMPUTER SCIENCE

- 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

*Ithaca, NY*

*August 2008 - May 2011*

### Amphenol PCD

INDUSTRIAL ENGINEERING CO-OP

- 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

*Beverly, MA*

*Fall 2009; Summer 2010*

## Professional Affiliations

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**Microanalysis Society**

**Materials Research Society**

**Microscopy Society of America**

# Publications

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## Research productivity

### SUMMARY STATISTICS:

- 6 published peer-reviewed articles; 7 conference proceedings
- 3 invited presentations; 26 contributed presentations
- 76 unique citations; *h*-index: 5 (from Google Scholar)

## REFEREED JOURNAL ARTICLES

### 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<sub>2</sub> 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

### 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<sub>2</sub> 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<sub>2</sub>O 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

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

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### INVITED

APPLICATIONS OF COMPRESSIVE SENSING FOR EDS ANALYSIS

Joshua A. Taillon

*Presented at the 2018 FIB/SEM User Group Meeting*

*Hamilton, ON, Canada*

*May 2018*

AN INTRODUCTION TO HYPERSPY: THE MULTI-DIMENSIONAL DATA ANALYSIS TOOLBOX

Joshua A. Taillon, Andrew A. Herzing

*A tutorial presented at the Tools for Electron Microscopists session at NIST*

*Gaithersburg, MD*

*Apr. 2018*

COMPUTATIONAL FRONTIERS IN MICROSCOPY AND MICROANALYSIS

Joshua A. Taillon

*Presented at A Celebration of Microscopy and Microanalysis*

*Gaithersburg, MD*

*Sept. 2017*

COMPRESSED SENSING APPLICATIONS IN MICROSCOPY AND MICROANALYSIS

Joshua A. Taillon

*Presented at the NIST CS-Bio-Metrology Working Group Meeting*

*Gaithersburg, MD*

*May 2017*

ANALYTICAL AND MICROSTRUCTURAL MICROSCOPY APPROACHES FOR MATERIALS CHARACTERIZATION

Joshua A. Taillon

*Presented at the U.S. Army Research Laboratory Methodology Seminar Series*

*Adelphi, MD*

*Dec. 2016*

ANALYTICAL ELECTRON MICROSCOPY OF INTERFACIAL STATES IN 4H-SiC/SiO<sub>2</sub> MOS DEVICES

Joshua A. Taillon, *et al.*

*Presented for Graduate Student Award consideration at the 2016 Fall Materials Research Society Meeting*

*Boston, MA*

*Nov. 2016*

### CONTRIBUTED

TEM-EELS INVESTIGATION OF BORON AND PHOSPHORUS PASSIVATED 4H-SiC/SiO<sub>2</sub> INTERFACE STRUCTURES

Christopher Klingshirn, Joshua A. Taillon, *et al.*

*Presented at the 2017 March American Physical Society Meeting*

*New Orleans, LA*

*Mar. 2017*

QUANTIFIABLE COMPARATIVE EVALUATION OF FIB/SEM INSTRUMENTS

Valery Ray, Joshua A. Taillon, *et al.*

*Presented at the 2017 FIB/SEM User Group Meeting*

*Gaithersburg, MD*

*Mar. 2017*

ANALYTICAL ELECTRON MICROSCOPY OF INTERFACIAL STATES IN 4H-SiC/SiO<sub>2</sub> MOS DEVICES

Joshua A. Taillon, *et al.*

*Presented at the 2016 Fall Materials Research Society Meeting*

*Boston, MA*

*Nov. 2016*

ADVANCED ANALYTICAL MICROSCOPY AT THE NANOSCALE: APPLICATIONS IN WIDE BANDGAP AND SOLID OXIDE FUEL CELL MATERIALS

Joshua A. Taillon

*Oral defense of Ph.D. Thesis*

*College Park, MD*

*July 2016*

PERFORMANCE AND DEGRADATION OF SOFC CATHODES AT REDUCED TEMPERATURE

Christopher Pellegrinelli, Joshua A. Taillon, *et al.*

*Presented at the 2016 Spring Electrochemical Society Meeting*

*San Diego, CA*

*May 2016*

REVEALING HIDDEN INTERFACIAL STATES IN NO PASSIVATED 4H-SiC/SiO<sub>2</sub> STRUCTURES USING TEM-EELS AND XPS

Joshua A. Taillon, *et al.*

*Presented at the 2016 March American Physical Society Meeting*

*Baltimore, MD*

*Mar. 2016*

ALLOYED NOBLE METAL NANOPARTICLES WITH TUNABLE OPTICAL PROPERTIES

Garrett C. Wessler, Joshua A. Taillon, *et al.*

*Presented at the 2016 March American Physical Society Meeting*

*Baltimore, MD*

*Mar. 2016*

PROBING THE NATURE OF INTERFACIAL STATES IN NO PASSIVATED 4H-SiC/SiO<sub>2</sub> STRUCTURES USING TEM-EELS AND XPS

Joshua A. Taillon, *et al.*

*Presented at the 2015 Fall Materials Research Society Meeting*

*Boston, MA*

*Dec. 2015*

TOMOGRAPHIC AND HYPERSPECTRAL ANALYSIS OF POROUS THREE-DIMENSIONAL SOLID OXIDE FUEL CELL CATHODES AT MULTIPLE LENGTH SCALES

Joshua A. Taillon, *et al.*

*Presented at the 2015 Fall Materials Research Society Meeting*

*Boston, MA*

*Nov. 2015*

CHARACTERIZATION OF THE OXIDE-SEMICONDUCTOR INTERFACE IN 4H-SiC/SiO<sub>2</sub> MOS STRUCTURES USING TEM AND XPS

Joshua A. Taillon, *et al.*

*Presented at the 10<sup>th</sup> Annual SiC MOS Program Review*

*College Park, MD*

*Aug. 2015*

CHARACTERIZATION OF THE OXIDE-SEMICONDUCTOR INTERFACE IN 4H-SiC/SiO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> STRUCTURES USING TEM AND XPS**  
Joshua A. Taillon, et al. College Park, MD  
 Presented at the *9<sup>th</sup> 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<sub>2</sub> 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<sub>2</sub> STRUCTURES USING TEM**  
Joshua A. Taillon, et al. College Park, MD  
 Presented at the *8<sup>th</sup> Annual SiC MOS Workshop* Aug. 2013
- CHARACTERIZATION OF THE OXIDE-SEMICONDUCTOR INTERFACE IN NO, P, AND N-PLASMA PASSIVATED 4H-SiC/SiO<sub>2</sub> STRUCTURES USING TEM**  
Joshua A. Taillon, et al. South Bend, IN  
 Presented at the *55<sup>th</sup> Electronic Materials Conference* June 2013
- CHARACTERIZATION OF THE OXIDE-SEMICONDUCTOR TRANSITION LAYER IN NO, P, AND N-PLASMA PASSIVATED 4H-SiC/SiO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> TRANSITION LAYER IN NO-ANNEALED MOSFETS**  
Joshua A. Taillon, et al. College Park, MD  
 Presented at the *7<sup>th</sup> 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