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Education

2010 PhD in Materials, University of California Santa Barbara
2006 BS in Materials Science & Engineering, Rensselaer Polytechnic Institute

Appointments held

2019-present *Associate Professor*
Department of Materials Science & Engineering
Massachusetts Institute of Technology

2018-2019 *Visiting Professor*
Department of Materials Science & Engineering
Massachusetts Institute of Technology

2016-2018 *Associate Director*
Analytical Instrumentation Facility
North Carolina State University

2016-2019 *Associate Professor*
Department of Materials Science & Engineering
North Carolina State University

2011-2016 *Assistant Professor*
Department of Materials Science & Engineering
North Carolina State University

2010 *Post-doctoral Scholar* Advisor: Susanne Stemmer
Materials Department
University of California Santa Barbara
2006-2010 *Graduate Research Assistant* Advisor: Susanne Stemmer
Materials Department
University of California Santa Barbara

Notable Honors & Awards

- 2019 Presidential Early Career Award for Scientists and Engineers (PECASE)
- 2018 NCSU University Faculty Scholar
- 2016 Microscopy & Microanalysis Journal Best Paper Award
- 2014 National Science Foundation CAREER Award
- 2014 AFOSR Young Investigator Program
- 2013 Microanalysis Society Kurt F. J. Heinrich Award - Leading Microscopist Under 40
- 2012 AReMS Young Investigator
- 2011 Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award
- 2009 Birks Award - Best Contributed Paper at the Microscopy and Microanalysis Meeting 2008
- 2008 Microbeam Analysis Society Distinguished Scholar Award
- 2008 International Center for Materials Research Fellowship
- 2007 Graduate Assistance in Areas of National Need (GAANN) Fellowship
- 2004 Rensselaer Founder's Award of Excellence

Journal Publications

- [1] S. Koohfar, A. B. Georgescu, A. N. Penn, **J. M. LeBeau**, E. Arenholz, and D. P. Kumah. Confinement of magnetism in atomically thin $\text{La}_{0.7}\text{Sr}_{0.3}\text{CrO}_3/\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ heterostructures. *npj Quantum Materials*, 4, 25, 2019.
- [2] R. Trappen, A. J. Grutter, C.-y. Huang, A. Penn, N. Mottaghi, S. Yousefi, A. Haertter, S. Kumari, **J. M. LeBeau**, B. J. Kirby, and M. B. Holcomb. Effect of oxygen stoichiometry on the magnetization profiles and negative magnetization in LSMO thin films. *Journal of Applied Physics*, 126, 105301, 2019.
- [3] K. P. Kelley, E. L. Runnerstrom, E. Sachet, C. T. Shelton, E. D. Grimley, A. Klump, **J. M. LeBeau**, Z. Sitar, J. Y. Suen, W. J. Padilla, and J.-P. Maria. Multiple Epsilon-Near-Zero Resonances in Multilayered Cadmium Oxide: Designing Metamaterial-Like Optical Properties in Monolithic Materials. *ACS Photonics*, 6, 1139–1145, 2019.
- [4] J. Houston Dycus, S. Washiyama, T. B. Eldred, Y. Guan, R. Kirste, S. Mita, Z. Sitar, R. Collazo, and **J. M. LeBeau**. The role of transient surface morphology on composition control in AlGaIn layers and wells. *Applied Physics Letters*, 114, 031602, 2019.
- [5] F. Li, M. J. Cabral, B. Xu, Z. Cheng, E. C. Dickey, **J. M. LeBeau**, J. Wang, J. Luo, S. Taylor, W. Hackenberger, L. Bellaiche, Z. Xu, L. Q. Chen, T. R. Shrout, and S. Zhang. Giant piezoelectricity of Sm-doped $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ single crystals. *Science*, 364, 264–268, 2019.
- [6] Z. Lim, N. Quackenbush, A. Penn, M. Chrysler, M. Bowden, Z. Zhu, J. Ablett, T.-L. Lee, J. LeBeau, J. Woicik, P. Sushko, S. Chambers, and J. Ngai. Charge Transfer and Built-in Electric Fields between a Crystalline Oxide and Silicon. *Physical Review Letters*, 123, 026805, 2019.
- [7] D. Pham, J. H. Dycus, **J. M. LeBeau**, V. R. Manga, K. Muralidharan, and E. L. Corral. Thermochemical model on the carbothermal reduction of oxides during spark plasma sintering of zirconium diboride. *Journal of the American Ceramic Society*, 102, 757–767, 2019.
- [8] E. Radue, E. L. Runnerstrom, K. P. Kelley, C. M. Rost, B. F. Donovan, E. D. Grimley, **J. M. LeBeau**, J.-P. Maria, and P. E. Hopkins. Charge confinement and thermal transport processes in modulation-doped epitaxial crystals lacking lattice interfaces. *Physical Review Materials*, 3, 032201, 2019.

- [9] X. Chen, Y. Wang, K. Wiaderek, X. Sang, O. Borkiewicz, K. Chapman, **J. M. LeBeau**, J. Lynn, and X. Li. Super Charge Separation and High Voltage Phase in NaxMnO_2 . *Advanced Functional Materials*, 28, 1805105, 2018.
- [10] C. C. Milleville, E. Y. Chen, K. R. Lennon, J. M. Cleveland, A. Kumar, J. Zhang, J. A. Bork, A. Tessier, **J. M. LeBeau**, D. B. Chase, J. M. O. Zide, and M. F. Doty. Engineering Efficient Photon Upconversion in Semiconductor Heterostructures. *ACS Nano*, in press, acsnano.8b07062, 2018.
- [11] W. Xu and **J. M. LeBeau**. A deep convolutional neural network to analyze position averaged convergent beam electron diffraction patterns. *Ultramicroscopy*, 188, 59–69, 2018.
- [12] E. D. Grimley, T. Schenk, T. Mikolajick, U. Schroeder, and **J. M. LeBeau**. Atomic Structure of Domain and Interphase Boundaries in Ferroelectric HfO_2 . *Advanced Materials Interfaces*, 5, 1701258, 2018.
- [13] M. J. Cabral, S. Zhang, E. C. Dickey, and **J. M. LeBeau**. Gradient chemical order in the relaxor $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$. *Applied Physics Letters*, 112, 082901, 2018.
- [14] R. Dhall, D. Vigil-Fowler, J. Houston Dycus, R. Kirste, S. Mita, Z. Sitar, R. Collazo, and **J. M. LeBeau**. Probing collective oscillation of d-orbital electrons at the nanoscale. *Applied Physics Letters*, 112, 061102, 2018.
- [15] F. P. G. Fengler, R. Nigon, P. Muralt, E. D. Grimley, X. Sang, V. Sessi, R. Hentschel, **J. M. LeBeau**, T. Mikolajick, and U. Schroeder. Analysis of Performance Instabilities of Hafnia-Based Ferroelectrics Using Modulus Spectroscopy and Thermally Stimulated Depolarization Currents. *Advanced Electronic Materials* 1700547, 2018.
- [16] W. Xu, J. H. Dycus, and **J. M. LeBeau**. Numerical modeling of specimen geometry for quantitative energy dispersive X-ray spectroscopy. *Ultramicroscopy*, 184, 100–108, 2018.
- [17] S. Boyd, R. Dhall, **J. M. LeBeau**, and V. Augustyn. Charge storage mechanism and degradation of P2-type sodium transition metal oxides in aqueous electrolytes. *Journal of Materials Chemistry A*, 6, 22266–22276, 2018.
- [18] S. R. Broderick, A. Kumar, A. A. Oni, **J. M. LeBeau**, S. B. Sinnott, and K. Rajan. Discovering chemical site occupancy-modulus correlations in Ni based intermetallics via statistical learning methods. *Computational Condensed Matter*, 14, 8–14, 2018.
- [19] J. H. Dycus, K. J. Mirrielees, E. D. Grimley, R. Kirste, S. Mita, Z. Sitar, R. Collazo, D. L. Irving, and **J. M. LeBeau**. Structure of Ultrathin Native Oxides on III-Nitride Surfaces. *ACS Applied Materials and Interfaces*, 10, 10607–10611, 2018.
- [20] E. D. Grimley, A. P. Wynn, K. P. Kelley, E. Sachet, J. S. Dean, C. L. Freeman, J.-p. Maria, and **J. M. LeBeau**. Complexities of atomic structure at CdO/MgO and $\text{CdO}/\text{Al}_2\text{O}_3$ interfaces. *Journal of Applied Physics*, 124, 205302, 2018.
- [21] R. Kirste, Q. Guo, J. H. Dycus, A. Franke, S. Mita, B. Sarkar, P. Reddy, **J. M. LeBeau**, R. Collazo, and Z. Sitar. $6 \text{ kW}/\text{cm}^2$ UVC laser threshold in optically pumped lasers achieved by controlling point defect formation. *Applied Physics Express*, 11, 082101, 2018.
- [22] R. Trappen, A. C. Garcia-Castro, V. T. Tra, C. Y. Huang, W. Ibarra-Hernandez, J. Fitch, S. Singh, J. Zhou, G. Cabrera, Y. H. Chu, **J. M. LeBeau**, A. H. Romero, and M. B. Holcomb. Electrostatic potential and valence modulation in $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ thin films. *Scientific Reports*, 8, 14313, 2018.

- [23] J. Dycus and **J. M. LeBeau**. A reliable approach to prepare brittle semiconducting materials for cross-sectional transmission electron microscopy. *Journal of Microscopy*, 268, 225–229, 2017.
- [24] R. M. Moghadam, Z. Xiao, K. Ahmadi-Majlan, E. D. Grimley, M. Bowden, P.-V. Ong, S. A. Chambers, **J. M. LeBeau**, X. Hong, P. V. Sushko, and J. H. Ngai. An Ultrathin Single Crystalline Relaxor Ferroelectric Integrated on a High Mobility Semiconductor. *Nano Letters*, 17, 6248–6257, 2017.
- [25] C. Richter, T. Schenk, M. H. Park, F. A. Tschardt, E. D. Grimley, **J. M. LeBeau**, C. Zhou, C. M. Fancher, J. L. Jones, T. Mikolajick, and U. Schroeder. Si doped hafnium oxide - A “fragile” ferroelectric system. *Advanced Electronic Materials*, 3, 1700131, 2017.
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- [27] K. T. Faber, T. Asefa, M. Backhaus-Ricoult, R. Brow, J. Y. Chan, S. Dillon, W. G. Fahrenholtz, M. W. Finnis, J. E. Garay, R. E. García, Y. Gogotsi, S. M. Haile, J. Halloran, J. Hu, L. Huang, S. D. Jacobsen, E. Lara-Curzio, **J. M. LeBeau**, W. E. Lee, C. G. Levi, I. Levin, J. A. Lewis, D. M. Lipkin, K. Lu, J. Luo, J.-P. Maria, L. W. Martin, S. Martin, G. Messing, A. Navrotsky, N. P. Padture, C. Randall, G. S. Rohrer, A. Rosenflanz, T. A. Schaedler, D. G. Schlom, A. Sehirlioglu, A. J. Stevenson, T. Tani, V. Tikare, S. Trolier-McKinstry, H. Wang, and B. Yildiz. The role of ceramic and glass science research in meeting societal challenges: Report from an NSF-sponsored workshop. *Journal of the American Ceramic Society*, 100, 1777–1803, 2017.
- [28] J. B. Mitchell, W. C. Lo, A. Genc, **J. M. LeBeau**, and V. Augustyn. Transition from Battery to Pseudocapacitor Behavior via Structural Water in Tungsten Oxide. *Chemistry of Materials*, 29, 3928–3937, 2017.
- [29] D. Jung, J. Faucher, S. Mukherjee, A. Akey, D. J. D. Ironside, M. Cabral, X. Sang, **J. M. LeBeau**, S. S. R. Bank, T. Buonassisi, O. Moutanabbir, and M. L. M. Lee. Highly tensile-strained Ge/InAlAs nanocomposites. *Nature Communications*, 8, 14204, 2017.
- [30] M. H. Park, T. Schenk, C. M. Fancher, E. D. Grimley, C. Zhou, C. Richter, **J. M. LeBeau**, J. L. Jones, T. Mikolajick, and U. Schroeder. A comprehensive study on the structural evolution of HfO₂ thin films doped with various dopants. *Journal of Materials Chemistry C*, 5, 4677–4690, 2017.
- [31] W. Xu, P. C. Bowes, E. D. Grimley, D. L. Irving, and **J. M. LeBeau**. In-situ real-space imaging of single crystal surface reconstructions via electron microscopy. *Applied Physics Letters*, 109, 201601, 2016.
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- [33] Z. Chen, M. Weyland, X. Sang, W. Xu, J. Dycus, **J. M. LeBeau**, A. D’Alfonso, L. Allen, and S. Findlay. Quantitative atomic resolution elemental mapping via absolute-scale energy dispersive X-ray spectroscopy. *Ultramicroscopy*, 168, 7–16, 2016.
- [34] E. D. Grimley, T. Schenk, X. Sang, M. Pešić, U. Schroeder, T. Mikolajick, and **J. M. LeBeau**. Structural Changes Underlying Field-Cycling Phenomena in Ferroelectric HfO₂ Thin Films. *Advanced Electronic Materials*, 2, 1600173, 2016.

- [35] J. Dycus, W. Xu, X. Sang, A. D'Alfonso, Z. Chen, M. Weyland, L. Allen, S. Findlay, and **J. M. LeBeau**. Influence of experimental conditions on atom column visibility in energy dispersive X-ray spectroscopy. *Ultramicroscopy*, 171, 1–7, 2016.
- [36] M. Pešić, F. P. G. Fengler, L. Larcher, A. Padovani, T. Schenk, E. D. Grimley, X. Sang, **J. M. LeBeau**, S. Slesazek, U. Schroeder, and T. Mikolajick. Physical Mechanisms behind the Field-Cycling Behavior of HfO₂-Based Ferroelectric Capacitors. *Advanced Functional Materials*, 26, 4601–4612, 2016.
- [37] A. Oni, S. Broderick, K. Rajan, and **J. M. LeBeau**. Atom site preference and γ'/γ mismatch strain in NiAlCoTi superalloys. *Intermetallics*, 73, 72–78, 2016.
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- [39] J. Houston Dycus, W. Xu, D. J. Lichtenwalner, B. Hull, J. W. Palmour, and **J. M. LeBeau**. Structure and chemistry of passivated SiC/SiO₂ interfaces. *Applied Physics Letters*, 108, 201607, 2016.
- [40] W. Xu, J. Dycus, X. Sang, and **J. M. LeBeau**. A numerical model for multiple detector energy dispersive X-ray spectroscopy in the transmission electron microscope. *Ultramicroscopy*, 164, 51–61, 2016.
- [41] X. Sang and **J. M. LeBeau**. Characterizing the response of a scintillator-based detector to single electrons. *Ultramicroscopy*, 161, 3–9, 2016.
- [42] Y. Z. Tan, A. Cheng, C. S. Potter, and B. Carragher. Automated data collection in single particle electron microscopy. *Microscopy*, 65, 43–56, 2016.
- [43] A. Zaddach, C. Niu, A. Oni, M. Fan, **J. M. LeBeau**, D. Irving, and C. Koch. Structure and magnetic properties of a multi-principal element Ni–Fe–Cr–Co–Zn–Mn alloy. *Intermetallics*, 68, 107–112, 2016.
- [44] A. Nozariasbmarz, P. Roy, Z. Zamanipour, J. H. Dycus, M. J. Cabral, **J. M. LeBeau**, J. S. Krasinski, and D. Vashaee. Comparison of thermoelectric properties of nanostructured Mg₂Si, FeSi₂, SiGe, and nanocomposites of SiGe–Mg₂Si, SiGe–FeSi₂. *APL Materials*, 4, 104814, 2016.
- [45] D. Pham, J. H. Dycus, **J. M. LeBeau**, V. R. Manga, K. Muralidharan, and E. L. Corral. Processing low-Oxide ZrB₂ ceramics with high strength using boron carbide and spark plasma sintering. *Journal of the American Ceramic Society*, 8, 1–8, 2016.
- [46] C.-Y. Huang, J. Zhou, V. T. Tra, R. White, R. Trappen, A. T. N'Diaye, M. Spencer, C. Frye, G. B. Cabrera, V. Nguyen, **J. M. LeBeau**, Y.-H. Chu, and M. B. Holcomb. Imaging magnetic and ferroelectric domains and interfacial spins in magnetoelectric La_{0.7}Sr_{0.3}MnO₃/PbZr_{0.2}Ti_{0.8}O₃ heterostructures. *Journal of physics. Condensed matter : an Institute of Physics journal*, 27, 504003, 2015.
- [47] C. Eaton, J. A. Moyer, H. M. Alipour, E. D. Grimley, M. Brahlek, **J. M. LeBeau**, and R. Engel-Herbert. Growth of SrVO₃ thin films by hybrid molecular beam epitaxy. *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films*, 33, 061504, 2015.
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- S. Stemmer, and C. S. Fadley. Depth-resolved composition and electronic structure of buried layers and interfaces in a $\text{LaNiO}_3/\text{SrTiO}_3$ superlattice from soft- and hard- X-ray standing-wave angle-resolved photoemission. *Journal of Electron Spectroscopy and Related Phenomena*, 211, 70–81, 2015.
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- [55] S. Raju, A. Oni, B. Godwal, J. Yan, V. Drozd, S. Srinivasan, **J. M. LeBeau**, K. Rajan, and S. Saxena. Effect of B and Cr on elastic strength and crystal structure of Ni_3Al alloys under high pressure. *Journal of Alloys and Compounds*, 619, 616–620, 2015.
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- [59] A. Oni, D. Hook, J. Maria, and **J. M. LeBeau**. Phase coexistence in Ti_6Sn_5 intermetallics. *Intermetallics*, 51, 48–52, 2014.
- [60] E. Mily, A. Oni, **J. M. LeBeau**, Y. Liu, H. Brown-Shaklee, J. Ihlefeld, and J.-P. Maria. The role of terminal oxide structure and properties in nanothermite reactions. *Thin Solid Films*, 562, 405–410, 2014.
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Patents

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Professional Membership

Member of the Microscopy Society of America, the Microanalysis Society (Education Chair), the Materials Research Society, and the American Ceramics Society.

Service to the profession

JOURNAL REFEREE

Science, Nature, Nature Materials, Nature Communications, Nature Energy, Scientific Reports, Advanced Structural and Chemical Imaging, Advanced Energy Materials, Journal of Alloys and Compounds, Micron, Journal of Applied Physics, Nano Letters, Ultramicroscopy, Thin Solid Films, Applied Physics Letters, Journal of Materials Chemistry, Microscopy and Microanalysis, Semiconductor Science and Technology

PROPOSAL REFEREE

National Science Foundation, Fonds Recherche Québec-Nature et Technologies, Technology Foundation STW (The Netherlands), Department of Energy (DOE) Office of Science, Air Force Office of Science Research

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Microscopy and Microanalysis 2018 | **Role:** Co-Chair | **Dates:** 8/5 - 8/9 2018 | **Location:** Baltimore, MD

SYMPOSIUM ORGANIZATION

Title: Quantitative Measurement of Intensities and Distances in Electron Microscopy | **Role:** Organizer | **Meeting:** Microscopy and Microanalysis | **Dates:** 7/24/2016 - 7/28/2016 | **Location:** Columbus, OH

Title: Nanoscale Characterization and Microscopy | **Role:** Invited Organizer | **Meeting:** Electronic Materials Conference | **Dates:** 6/22/2014 - 6/25/2014

Title: Nanoscale Characterization and Microscopy | **Role:** Invited Organizer | **Meeting:** Electronic Materials Conference | **Dates:** 6/23/2015 - 6/26/2015