

# Lane W. Martin

Professor & Associate Chair, Materials Science and Engineering  
University of California, Berkeley  
Faculty Scientist, Materials Sciences Division  
Lawrence Berkeley National Laboratory

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## PROFESSIONAL PREPARATION

Carnegie Mellon University	B.S., Materials Science and Engineering	2003
University of California, Berkeley	M.S., Materials Science and Engineering	2006
University of California, Berkeley	Ph.D., Materials Science and Engineering	2008
Lawrence Berkeley National Lab.	Postdoctoral Fellow, Materials Sciences Division	2008-09

## APPOINTMENTS

2018-	Associate Chair of Materials Science and Engineering, University of California, Berkeley
2018-	Professor of Materials Science and Engineering, University of California, Berkeley and Faculty Scientist, Materials Sciences Division, Lawrence Berkeley National Laboratory
2014-2018	Associate Professor of Materials Science and Engineering, University of California, Berkeley and Faculty Scientist, Materials Sciences Division, Lawrence Berkeley National Laboratory
2009-2014	Assistant Professor of Materials Science and Engineering and Faculty Affiliate of the Materials Research Laboratory, University of Illinois, Urbana-Champaign
2008-2009	Postdoctoral Fellow, Quantum Materials Group, Materials Sciences Division, Lawrence Berkeley National Laboratory
2004-2008	NSF IGERT Fellow in Nanoscience and Engineering and Intel Robert Noyce Fellow in Microelectronics, Graduate Researcher, Department of Materials Science and Engineering, University of California, Berkeley

## HONORS AND AWARDS

1. 2018 Highly Cited Researcher – Ranked in the top 1% by citations for field and publication year in Web of Science (Nov. 2018)
2. 2017 Excellence in Laboratory Safety Grand Prize, UC Berkeley Environmental, Health, and Safety (EHS) (Feb. 2018)
3. Robert L. Coble Award for Young Scholars, American Ceramic Society (Oct. 2016)
4. American Association for Crystal Growth (AACG) Young Author Award (Aug. 2015)
5. Presidential Early Career Award for Scientists and Engineers, President of the United States of America (Dec. 2013)
6. Dean's Award for Excellence in Research, College of Engineering, University of Illinois (Feb. 2013)
7. National Science Foundation CAREER Award (Aug. 2012)
8. Army Research Office Young Investigator Program (YIP) Award Winner (Oct. 2010)
9. Intel Robert Noyce Fellow in Microelectronics (2007–2008)
10. National Science Foundation IGERT Fellow in Nanoscience and Engineering (2004–2007)
11. Sapphire Award Winner, Graduate Excellence in Materials Science (GEMS), Materials Science and Technology Meeting (2006)
12. Berkeley Summer Institute for Preparing Future Faculty - Institute Fellow (Summer 2008)
13. Gold Medal Award Winner, Materials Research Society Graduate Student Award (2006)
14. William T. Lankford Jr. Memorial Scholarship (May 2004, Carnegie Mellon University)

## PUBLICATIONS [h-index = 51; i10-index = 121; ~13,200 citations]

1. J. C. Agar, B. Naul, S. Pandya, S. van der Walt, J. Maher, R. Yao, T. Schmidt, J. B. Neaton, Sergei V. Kalinin, R. K. Vasudevan, Y. Cao, J. S. Bloom, **L. W. Martin**, Revealing ferroelectric switching character using deep recurring neural networks. in preparation Sept. 2018.
2. X. Lu, Z. Chen, Y. Cao, Y. Tang, R. Xu, S. Saremi, Z. Zhang, Y. Dong, S. Das, H. Zhang, L. Zheng, W. Lu, J. Li, L. Chen, H. Li, W. Cao, **L. W. Martin**, Non-local domain switching in ferroelectric thin films. in preparation Nov. 2018.
3. H. Taz, B. Prasad, Y.-L. Huang, Z. Chen, S.-L. Hsu, R. Xu, V. Thakare, T. S. Sakthivel, C. Liu, C. Henri-Lambert, M. Hettick, R. Mukherjee, S. Seal, **L. W. Martin**, A. Javey, G. Duscher, R. Ramesh, R.

- Kalyanaraman, Amorphous Fe-Dy-Tb-oxide ferromagnetic films for room-temperature semiconductor spintronics. *Nature Mater.* submitted Nov. 2018.
4. K. X. Nguyen, Y. Jiang, M. C. Cao, P. Purohit, A. K. Yadav, P. García-Fernández, Z. Hong, M. W. Tate, C. S. Chang, P. Aguado-Puente, J. Iñiguez, L.-Q. Chen, S. M. Gruner, J. Junquera, **L. W. Martin**, R. Ramesh, D. A. Muller, Transferring orbital angular momentum to an electron beam reveals toroidal and chiral order. *Nature.* submitted Oct. 2018.
  5. J. Kim, Y. Qi, A. R. Damodaran, R. Gao, H. Takenaka, S. Pandya, M. R. McCarter, A. M. Rappe, **L. W. Martin**, Strain-dependent domain and property evolution in a relaxor ferroelectric. *Phys. Rev. X* under review Oct. 2018.
  6. S. Pandya, G. Velarde, L. Zhang, **L. W. Martin**, Pyroelectric and electrocaloric effects in ferroelectric silicon-doped hafnium oxide thin films. *Phys. Rev. Mater.* under review Oct. 2018.
  7. Y. Takamura, K. Leonard, A. Luo, **L. W. Martin**, H. Matsumoto, Platinum nanoparticle induced nanoionics effects on electrical conduction in strontium cerate and zirconate. *J. Sol. Stat. Electrochem.* under review Oct. 2018.
  8. S. Pandya, G. Velarde, L. Zhang, J. Wilbur, A. Smith, B. Hanrahan, C. Dames, **L. W. Martin**, New approaches to waste-heat energy harvesting – Pyroelectric energy conversion. *NPG Asia Mater.* under review Oct. 2018. [Invited perspective]
  9. D. Meng, Y. Xiao, H. He, Y. Liao, H. Zhang, J. Zhai, Z. Chen, **L. W. Martin**, F. Bai, Enhanced spontaneous polarization in double perovskite  $\text{Bi}_2\text{FeCrO}_6$ . *ACS Appl. Mater. Inter.* under review Oct. 2018.
  10. R. Gao, S. Pandya, Y. Dong, H. Zhao, A. I. Luo, L. R. Dedon, V. Thoreton, R. Xu, S. Saremi, T. Chen, A. Jain, T. Ishihara, D. R. Trinkle, N. H. Perry, **L. W. Martin**, Structural considerations in designing high-ionic-conducting perovskites. *Nature Mater.* under review Oct. 2018.
  11. R. Xu, S. Liu, S. Saremi, R. Gao, H. Lu, J. J. Wang, Z. J. Hong, A. Ghosh, S. Pandya, E. Bonturim, Z. Chen, L.-Q. Chen, A. M. Rappe, **L. W. Martin**, Tunable, multi-state switching in ferroelectric thin films. *Nature Commun.* under review Oct. 2018.
  12. S. Das, Y. L. Tang, Z. Hong, M. Gonçalves, M. R. McCarter, F. Gómez-Oritz, S.-L. Hsu, C. Klewe, P. Shafer, E. Arenholz, C. Ophus, J. F. Liu, C. T. Nelson, B. Prasad, A. R. B. Mei, D. G. Schlom, J. Iñiguez, P. García-Fernández, L. Q. Chen, J. Junquera, **L. W. Martin**, R. Ramesh, Observation of room temperature polar skyrmions. *Nature* under review Oct. 2018.
  13. S. Shetty, A. R. Damodaran, K. Wang, Y. Yuan, V. Gopalan, **L. W. Martin**, S. Trolier-McKinstry, Digital relaxor: exploring the origin of relaxor behavior in engineered lead magnesium niobate ( $\text{PbMg}_{1/3}\text{Nb}_{2/3}\text{O}_3$ ) thin films. *Adv. Funct. Mater.* under review Oct. 2018.
  14. V. A. Stoica, N. Laanait, C. Dai, Z. Hong, Y. Yuan, Z. Zhang, S. Lei, M. R. McCarter, A. Yadav, A. R. Damodaran, S. Das, G. A. Stone, J. Karapetrova, D. A. Walko, X. Zhang, **L. W. Martin**, R. Ramesh, L.-Q. Chen, H. Wen, V. Gopalan, J. W. Freeland, Optical creation of a supercrystal with three-dimensional nanoscale periodicity. *Nature Mater.* under review Oct. 2018.
  15. S. Pandya, G. A. Velarde, R. Gao, A. Everhardt, R. Xu, J. T. Maher, J. C. Agar, **L. W. Martin**, Understanding the role of ferroelastic domains on the pyroelectric and electrocaloric effects in ferroelectric thin films. *Adv. Mater.* accepted (2018).
  16. T. C. Kaspar, P. V. Sushko, S. R. Spurgeon, M. E. Bowden, D. J. Keavney, R. B. Comes, S. Saremi, L.W. Martin, S. A. Chambers, Band offset and built-in potential at  $\text{LaMnO}_3/\text{SrTiO}_3$  polar/non-polar heterojunctions. *Chem. Mater.* accepted (2018).
  17. A. V. Ilev, C. Brown, J. C. Agar, G. A. Velarde, **L. W. Martin**, P. Maksymovych, S. V. Kalinin, O. S. Ovchinnikova, Nanoscale electrochemical phenomena of polarization switching in ferroelectrics. *ACS Appl. Mater. Inter.* **10**, 38217-38222 (2018).
  18. S. Das, A. Ghosh, M. R. McCarter, S.-L. Hsu, Y.L. Tang, A. R. Damodaran, R. Ramesh, **L. W. Martin**, Perspective: Emergent topologies in oxide superlattices. *APL Mater.* **6**, 100901 (2018) [Invited perspective]
  19. **L. W. Martin**, A. M. Rappe, *Functional ceramic materials* in K. Alberi, M. B. Nardelli, A. Zakutayev, L. Mitas, S. Curtarolo, A. Jain, M. Fornari, N. Marzari, I. Takeuchi, M. L. Green, M. Kanatzidis, M. F. Toney, S. Butenko, B. Meredig, S. Lany, U. Kattner, A. Davydov, E. S. Torberer, V. Stevanovic, A. Walsh, N.-G. Park, A. Aspuru-Guzik, D. P. Tabor, J. Nelson, J. Murphy, A. Setlur, J. Gregoire, H. Li, R. Xiao, A. Ludwig,

- L. W. Martin**, A. M. Rappe, S.-H. Wei, J. Perkins, The 2019 Materials by Design Roadmap. *J. Phys. D.* **52**, 013001 (2018). [Invited perspective]
20. J. S. Lim, J. H. Lee, R. Gao, T. Y. Koo, **L. W. Martin**, R. Ramesh, C.-H. Yang, Ultrafast collective oxygen-vacancy flow in Ca-doped BiFeO<sub>3</sub>. *NPG Asia Mater.* **10**, 943-955 (2018).
  21. A. Dasgupta, S. Saremi, R. Xu, L. R. Dedon, S. Pandya, A. R. Damodaran, **L. W. Martin**, Nonstoichiometry, structure, and properties of Ba<sub>1-x</sub>TiO<sub>3-y</sub> thin films. *J. Mater. Chem. C* **6**, 10751-10759 (2018).
  22. S. Zhang, H. Y. Xiao, S. M. Peng, G. X. Yang, Z. J. Liu, X. T. Zu, S. Li, D. J. Singh, **L. W. Martin**, L. Qiao, Band-gap reduction in (BiCrO<sub>3</sub>)<sub>m</sub>/(BiFeO<sub>3</sub>)<sub>n</sub> Superlattices: Designing new low-band-gap ferroelectrics. *Phys. Rev. Appl.* **10**, 044004 (2018).
  23. T. Angsten, **L. W. Martin**, M. Asta, Electronic and polar properties of vanadate compounds stabilized by epitaxial strain. *Chem. Mater.* **30**, 5870-5877 (2018).
  24. Z. Chen, Z. Chen, C.-Y. Kuo, J. Liu, L. R. Dedon, D. Chen, J. Clarkson, R. O. Cherifi, E. Arenholz, Y.-H. Chu, Z. Hu, L.-H. Tjeng, L.-W. Wang, **L. W. Martin**, Complex strain evolution of polar and magnetic order in multiferroic BiFeO<sub>3</sub> thin films. *Nature Commun.* **9**, 3764 (2018).
  25. Z. Gu, S. Pandya, A. Samanta, A. R. Damodaran, C. J. G. Meyers, G. Xiao, S. Liu, A. Dasguta, S. Saremi, L. Wu, A. Podpirka, A. Will-Cole, C. J. Hawley, P. K. Davies, R. A. York, I. Grinberg, **L. W. Martin**, J. E. Spanier, Resonant domain-wall-enhanced tunable microwave ferroelectrics. *Nature* **560**, 622-627 (2018).
  26. S. Saremi, R. Xu, F. Allen, J. Maher, J. C. Agar, P. Hosemann, **L. W. Martin**, Local control of defects and switching properties in ferroelectric thin films. *Phys. Rev. Mater.* **2**, 084414 (2018).
  27. J. C. Agar, Y. Cao, B. Naul, S. Pandya, S. van der Walt, A. I. Luo, J. T. Maher, A. R. Damodaran, N. Balke, S. Jesse, S. V. Kalinin, R. K. Vasudevan, **L. W. Martin**, Machine detection of enhanced electromechanical energy conversion in PbZr<sub>0.2</sub>Ti<sub>0.8</sub>O<sub>3</sub> thin films. *Adv. Mater.* **30**, 1800701 (2018).
  28. J. Xiao, H. Zhu, Y. Wang, W. Fang, Y. Hu, A. Dasgupta, Y. Han, Y. Wang, D. A. Muller, **L. W. Martin**, P. A. Hu, X. Zhang, Intrinsic two-dimensional ferroelectricity with dipole locking. *Phys. Rev. Lett.* **120**, 227601 (2018).
  29. R. Xu, R. Gao, S. E. Reyes-Lillo, S. Saremi, Y. Dong, H. Lu, Z. Chen, X. Lu, Y. Qi, S.-L. Hsu, A. R. Damodaran, H. Zhou, J. B. Neaton, **L. W. Martin**, Reducing coercive-field scaling in ferroelectric thin films via orientational control. *ACS Nano* **12**, 4736-4743 (2018).
  30. L. M. Zheng, X. R. Wang, W. M. Lu, C. J. Li, T. R. Paudel, Z. Q. Liu, Z. Huang, S. W. Zeng, K. Han, Z. H. Chen, X. Qiu, M. S. Li, S. Yang, B. Yang, M. Chisholm, **L. W. Martin**, S. Pennycook, E. Y. Tsymbal, J. M. D. Coey, W. W. Cao, Ambipolar ferromagnetism by electrostatic doping of a manganite. *Nature Commun.* **9**, 1897 (2018).
  31. P. Shafer, P. Garcia-Fernandez, P. Aguado-Puente, A. R. Damodaran, A. J. Yadav, C. T. Nelson, S.-L. Hsu, J. C. Wojdel, J. Iniguez, **L. W. Martin**, E. Arenholz, J. Junquera, R. Ramesh, Emergent chirality in polar vortex superlattices. *Proc. Nat. Acad. Sci.* **115**, 915-920 (2018).
  32. L. R. Dedon, Z. Chen, R. Gao, Y. Qi, E. Arenholz, **L. W. Martin**, Strain-driven phase competition near the antipolar-nonpolar phase boundary in Bi<sub>0.7</sub>La<sub>0.3</sub>FeO<sub>3</sub> thin films. *ACS Appl. Mater. Inter.* **10**, 14914-14921 (2018).
  33. S. Pandya, J. Wilbur, J. Kim, R. Gao, A. Dasgupta, C. Dames, **L. W. Martin**, Pyroelectric energy conversion with large energy and power density in relaxor ferroelectric thin films. *Nature Mater.* **17**, 432-438 (2018).
  34. A. V. Ilevlev, C. Brown, M. J. Burch, J. C. Agar, G. A. Velarde, **L. W. Martin**, P. Maksymovych, S. V. Kalinin, O. S. Ovchinnikova, Chemical phenomena of atomic force microscopy scanning. *Anal. Chem.* **90**, 3475-3481 (2018).
  35. A. V. Ilevlev, M. Chyashvichyus, D. Leonard, J. C. Agar, G. A. Velarde, **L. W. Martin**, S. V. Kalinin, P. Maksymovych, O. S. Ovchinnikova, Subtractive fabrication of ferroelectric thin films with precisely controlled thickness. *Nanotechnol.* **29**, 155302 (2018).
  36. S. Saremi, A. Dasgupta, R. Gao, **L. W. Martin**, New facets for the role of defects in ceramics [Invited feature, cover story]. *Am. Ceram. Soc. Bull.* **97**, 16-23 (2018).

37. S. Saremi, R. Xu, L. R. Dedon, **L. W. Martin**, Electronic transport and ferroelectric switching in ion-bombarded, defected-engineered BiFeO<sub>3</sub> thin films. *Adv. Mater. Inter.* **5**, 1700991 (2017).
38. A. I. Khan, M. Hoffmann, K. Chatterjee, Z. Lu, R. Xu, C. Serrao, S. Smith, **L. W. Martin**, C. C. Hu, R. Ramesh, S. Salahuddin, Differential voltage amplification induced by ferroelectric negative capacitance. *Appl. Phys. Lett.* **111**, 253501 (2017).
39. Y. Zhu, F. Chen, J. Park, K. Sasikuman, B. Hu, A. R. Damodaran, I. W. Jung, M. J. Highland, Z. Cai, I.-C. Tung, D. A. Walko, J. W. Freeland, **L. W. Martin**, S. K. R. S. Sankaranarayanan, P. G. Evans, A. M. Lindenberg, H. Wen, Structural imaging of nanoscale phonon transport in ferroelectrics excited by metamaterial-enhanced terahertz fields. *Phys. Rev. Mater.* **1**, 060601 (2017).
40. Q. Li, C. T. Nelson, S.-L. Hsu, A. R. Damodaran, A. K. Yadav, M. McCarter, **L. W. Martin**, R. Ramesh, S. V. Kalinin, Unravelling flexoelectricity in PbTiO<sub>3</sub>/SrTiO<sub>3</sub> superlattice polar vortices via machine learning-informed phase-field modeling. *Nature Commun.* **8**, 1468 (2017).
41. S. Pandya, **L. W. Martin**, Epitaxy on polycrystalline substrates (Invited perspective). *Science* **358**, 587-588 (2017).
42. Z. Chen, Z. Liu, Z. Chen, M. E. Holtz, C. Li, X. R. Wang, W. Lu, L. S. Fan, L. R. Dedon, C. Federick, R. Gao, R. Xu, A. T. N'Diaye, E. Arenholz, J. A. Mundy, T. Venkatesan, D. A. Muller, L.-W. Wang, J. Liu, **L. W. Martin**, Electron accumulation and emergent magnetism in LaMnO<sub>3</sub>/SrTiO<sub>3</sub> heterostructures. *Phys. Rev. Lett.* **119**, 156801 (2017).
43. A. R. Damodaran, S. Pandya, J. C. Agar, Y. Cao, R. K. Vasudevan, R. Xu, S. Saremi, Q. Li, J. Kim, M. R. McCarter, L. R. Dedon, T. Angsten, N. Balke, S. Jesse, M. Asta, S. V. Kalinin, **L. W. Martin**, Three-state ferroelectric switching and large electromechanical responses in PbTiO<sub>3</sub> thin films. *Adv. Mater.* **29**, 1702069 (2017).
44. A. R. Damodaran, J. Clarkson, Z. Hong, H. Liu, A. K. Yadav, C. T. Nelson, S.-L. Hsu, M. R. McCarter, K.-D. Park, V. Kravtsov, A. Farhan, Y. Dong, Z. Cai, H. Zhou, P. Aguado-Puente, P. Garcia-Fernandez, J. Iniguez, J. Junquera, A. Scholl, M. B. Raschke, L.-Q. Chen, D. D. Fong, R. Ramesh, **L. W. Martin**, Phase coexistence and electric-field control of toroidal order in oxide superlattices. *Nature Mater.* **16**, 1003-1009 (2017).
45. R. Gao, S. E. Reyes-Lillo, R. Xu, A. Dasgupta, Y. Dong, L. R. Dedon, J. Kim, S. Saremi, Z. H. Chen, C. R. Serrao, H. Zhou, J. B. Neaton, **L. W. Martin**, Ferroelectricity in Pb<sub>1+δ</sub>ZrO<sub>3</sub> thin films. *Chem. Mater.* **29**, 6544-6551 (2017).
46. T. Angsten, **L. W. Martin**, M. Asta, Orientation-dependent properties of epitaxially strained perovskite oxide thin films: insights from first-principles calculations. *Phys. Rev. B* **95**, 174110 (2017).
47. 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. 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. Sehrioglu, A. Stevensen, T. Tani, V. Tikare, S. Trolier-McKinstry, H. Wang, B. Yildiz, The role of ceramic and glass science research in meeting societal challenges: report from an NSF sponsored workshop. *J. Am. Ceram. Soc.* **100**, 1777-1803 (2017).
48. A. R. Damodaran\*, S. Pandya\*, Y. Qi, S.-L. Hsu, S. Liu, C. T. Nelson, J. Zhang, L. Dedon, P. Ercius, C. Ophus, J. C. Agar, H. Lu, Z. Chen, A. M. Minor, I. Grinberg, A. M. Rappe, **L. W. Martin**, Temperature-stable, high-tunability dielectrics via composition and polarization gradients. *Nature Commun.* **8**, 14961 (2017).
49. Z. Hong, A. R. Damodaran, F. Xue, S.-L. Hsu, J. Britson, A. K. Yadav, C. T. Nelson, J. Wang, J. F. Scott, **L. W. Martin**, R. Ramesh, L.-Q. Chen, Stability of polar vortex lattice in ferroelectric superlattices. *Nano Lett.* **17**, 2246-2252 (2017).
50. S. P. Rogers, R. Xu, S. Pandya, **L. W. Martin**, M. Shim, Slow conductance relaxation in graphene-ferroelectric field-effect transistors. *J. Phys. Chem. C* **121**, 7542-7548 (2017).
51. S. Pandya, J. D. Wilbur, B. Bhatia, A. R. Damodaran, C. Monachon, A. Dasgupta, W. P. King, C. Dames, **L. W. Martin**, Direct measurement of pyroelectric and electrocaloric effects in thin films. *Phys. Rev. Appl.* **7**, 034025 (2017).

52. Y. Chen, F. Ke, P. Ci, C. Ko, T. Park, S. Saremi, H. Liu, Y. Lee, J. Shi, **L. W. Martin**, J. W. Ager, B. Chen, J. Wu, Pressurizing field-effect transistors of few-layer MoS<sub>2</sub> in a diamond anvil cell. *Nano Lett.* **17**, 194-199 (2017).
53. B. Bhatia, H. Cho, J. Karthik, J. Choi, D. G. Cahill, **L. W. Martin**, W. P. King, High power density pyroelectric energy conversion in nanometer-thick BaTiO<sub>3</sub> films. *Nano. Micro. Thermophys. Eng.* **20**, 137-146 (2016).
54. S. Saremi, R. Xu, L. R. Dedon, J. M. Mundy, S.-L. Hsu, Z. Chen, A. R. Damodaran, S. P. Chapman, J. T. Evans, **L. W. Martin**, Enhanced electrical resistivity and properties via ion bombardment of ferroelectric thin films. *Adv. Mater.* **26**, 10750-10756 (2016).
55. F. Chen, Y. Zhu, S. Liu, Y. Qi, H. Hwang, N. C. Brandt, J. Lu, F. Quirin, H. Enquist, P. Zalden, T. Hu, J. Goodfellow, M. C. Hoffman, D. Zhu, H. Lemke, J. Glowina, M. Chollet, A. R. Damodaran, J. Park, Z. Cai, I. W. Jung, M. J. Highland, D. A. Walko, J. W. Freeland, P. G. Evans, A. Vailionis, J. Larsson, K. Nelson, A. M. Rappe, K. Sokolowski-Tinten, **L. W. Martin**, H. Wen, A. M. Lindenberg, Ultrafast terahertz-field-driven ionic response in ferroelectric BaTiO<sub>3</sub>. *Phys. Rev. B* **94**, 180104(R) (2016).
56. Z. Chen, X. Wang, Y. Qi, S. Yang, J. A. N. T. Soares, B. A. Apgar, R. Gao, R. Xu, Y. Lee, X. Zhang, J. Yao, **L. W. Martin**, Self-assembled, tunable metamaterials via spinodal decomposition. *ACS Nano* **10**, 10237-10244 (2016).
57. **L. W. Martin**, A. M. Rappe, Thin-film ferroelectric materials and devices [Invited review]. *Nature Rev. Mater.* **1**, 16087 (2016).
58. H. Lu, B. Wang, T. Li, A. Lipatov, H. Lee, A. Rajapitamahuni, R. Xu, X. Hong, B. Noheda, **L. W. Martin**, C.-B. Eom, L.-Q. Chen, A. Sinitskii, A. Gruverman, Domain engineering in ferroelectric capacitors with graphene electrodes. *Nano Lett.* **16**, 6460-6466 (2016).
59. J. C. Agar, S. Pandya, R. Xu, A. K. Yadav, S. Saremi, T. Angsten, M. D. Asta, R. Ramesh, **L. W. Martin**, Frontiers in multifunctional ferroic materials [Invited prospective]. *MRS Commun.* **6**, 151-166 (2016).
60. M. Brahlek, L. Zhang, H.-T. Zhang, J. Lapano, L. R. Dedon, **L. W. Martin**, R. Engel-Herbert, Mapping growth windows in quaternary perovskite oxide systems by hybrid molecular beam epitaxy. *Appl. Phys. Lett.* **109**, 101903 (2016).
61. L. R. Dedon, A. R. Damodaran, Z. Chen, S. Saremi, R. Gao, B. A. Apgar, **L. W. Martin**, Stoichiometry control of domain structure and electronic, dielectric, and ferroelectric properties of BiFeO<sub>3</sub> films. *Chem. Mater.* **28**, 5952-5961 (2016).
62. R. Gao, Y. Dong, H. Xu, H. Zhou, Y. Yuan, V. Gopalan, C. Gao, D. D. Fong, Z. H. Chen, Z. Luo, **L. W. Martin**, Interfacial octahedral rotation mismatch control of the symmetry and properties of SrRuO<sub>3</sub>. *ACS Appl. Mater. Inter.* **8**, 14871-14878 (2016).
63. A. Tselev, P. Yu, Y. Cao, L. R. Dedon, **L. W. Martin**, S. V. Kalinin, P. Maksymovych, Microwave a.c. conductivity of domain walls in ferroelectric thin film. *Nature Commun.* **7**, 11630 (2016).
64. S. Pandya, A. R. Damodaran, R. Xu, S. L. Hsu, J. C. Agar, **L. W. Martin**, Strain-induced instability and surface patterning in perovskite thin films. *Sci. Rep.* **6**, 26075 (2016).
65. J. H. Hinnefeld, R. Xu, S. Rogers, M. Shim, **L. W. Martin**, N. Mason, Single gate p-n junctions in graphene-ferroelectric devices. *Appl. Phys. Lett.* **108**, 203109 (2016).
66. A. R. Damodaran, J. C. Agar, S. Pandya, Z. Chen, L. Dedon, R. Xu, B. Apgar, S. Saremi, **L. W. Martin**, New modalities of strain-control of ferroelectric thin films (Invited review). *J. Phys. Condens. Matter* **28**, 263001 (2016).
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#### EDITORIAL FUNCTIONS, BOOKS, AND BOOK CHAPTERS

1. R. V. K. Mangalam, J. Moyer, **L. W. Martin**, Epitaxial Growth of Magnetic Oxide Thin Films, in *Epitaxial Growth of Complex Metal Oxides*, Eds. G. Koster and G. Rijnders, Woodhead: New York (2015).
2. **L.W. Martin**, Y.-H. Chu, R. Ramesh, Emerging Multiferroic Memories, in *Emerging Nonvolatile Memories*, Eds. S. Hong, O. Auciello, and D. Wouters, Springer: New York (2014).
3. **L. W. Martin** (Ed.), *Multiferroics in Curr. Opin. Solid Stat. Mater. Sci.* **16**, 199-268 (2012).
4. **L.W. Martin**, Multiferroics, Invited chapter, *McGraw-Hill 2009 Yearbook of Science and Technology*, McGraw-Hill: Columbus (2009).

#### PATENTS

1. Zongquan Gu, Jonathan E. Spanier, **Lane W. Martin**, Christopher R. Elsass, Alessia Polemi, Anoop Damodaran, Engineered Dielectric Meta-Materials, U.S. Patent Application No. 62/485,297 (Filed Apr. 13, 2017).
2. William P. King, **Lane W. Martin**, Patrick C. Fletcher, Electron Emission Device, US Patent No. 9,685,295 B2 (Awarded June 20, 2017).
3. Robert J. Zeches, **Lane W. Martin**, Ramamoorthy Ramesh, Thin film bismuth iron oxides useful for piezoelectric devices, US Patent No. US 9,356,224 B2 (Awarded May 31, 2016).
4. **Lane W. Martin**, Sungki Lee, Brent Apgar, Light Absorbing Oxide Materials for Advanced Photovoltaic and Photocatalytic Applications and Devices, U.S. Patent Application No. US20140060643 (Filed Sept. 4, 2013).
5. Jan Seidel, Ramamoorthy Ramesh, **Lane W. Martin**, Seung-Yeul Yang, Ferroic Materials Having Domain Walls and Related Devices, US Patent Application US 20110308580 (Dec. 22, 2011). [not pursued to final patent]

#### INVITED TALKS

1. L. W. Martin, *Designing High Performance Electrode and Ionic Conducting Perovskite Materials - Lessons from Thin-film Epitaxy*, 2019 I2CNER MPD-EEC Division Symposium (Feb. 2019, Fukuoka, Japan).
2. L. W. Martin, *Revealing Switching Character in Ferroelectric Thin Films: Insights from Multidimensional Spectroscopy and Deep Learning*, 2019 Conference on Electronic Materials and Applications (Jan. 2019, Orlando, FL).
3. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, DOW Lecture, Department of Materials Science and Engineering, Northwestern University (Nov. 2018, Evanston, IL).
4. L. W. Martin, *Emergent Order and Function in Ferroic Superlattices – Towards Electric Skyrmions and New Phase Transitions*, APCTP Workshop on Multiferroics 2018 (Nov. 2018, KAIST, Daejeon, Korea).
5. L. W. Martin, *Revealing Switching Character in Ferroelectric Thin Films: Insights from Multidimensional Spectroscopy and Deep Learning*, 2019 ALS User's Meeting (Oct. 2018, Berkeley, CA).

6. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films – Beyond Bistability*, European Materials Research Society (EMRS) (Sept. 2018, Warsaw, Poland).
7. L. W. Martin, *Pyroelectric Energy Conversion – Overview and Demonstration of Novel Thermal-Energy Conversion*, Energy Harvesting Society Meeting (Sept. 2018, Philadelphia, PA).
8. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, Departments of Materials Science and Engineering and Physics Special Seminar, University of Pennsylvania (Sept. 2018, Philadelphia, PA).
9. L.W. Martin, *New Applications for Old Materials – Pyroelectric Energy Conversion with Relaxor Thin Films*, Zhejiang University-UC Berkeley Joint Symposium on Advanced Materials (Aug. 2018, Berkeley, CA)
10. J. C. Agar, L. W. Martin, *Nanoscale Susceptibilities in Ferroelectric Thin Films: Insights from Multidimensional Spectroscopy and Machine Learning*, International Conferences on Modern Materials and Technologies (CIMTEC) 2018 (June 2018, Perugia, Italy).
11. L. W. Martin, *Relaxor Ferroelectric Thin Films – Strain, Size, and Chemistry Effects and Potential for Novel Applications*, IEEE ISAF-FMA-AMF-AMEC-PFM Joint Conference (IFAAP 2018) (May 2018, Hiroshima, Japan).
12. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, Department of Physics Seminar, University of Electronic Science and Technology (UESTC) (May 2018, Chengdu, China).
13. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, University of Texas, El Paso/University of California, Santa Barbara NSF Partnership in Research, Education, and Materials (PREM) Seminar (Apr. 2018, El Paso, TX).
14. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, Department of Materials Science and Engineering Seminar, Norwegian National Technical University (NTNU) (Mar. 2018, Trondheim, Norway).
15. L. W. Martin, *Polarization Gradients, Built-in Potentials, Exotic Domain Structures, and Temperature-Stable Responses: Compositionally-graded Ferroelectric Thin Films*, Fundamental Physics of Ferroelectrics and Related Materials 2018 (Jan. 2018, Washington, DC).
16. L. W. Martin, *The Good, The Bad, and the Ugly – Redefining the Role of Defects Complex-Oxide Thin Films*, 2018 Conference on Electronic and Advanced Materials (Jan. 2018, Orlando, FL).
17. L. W. Martin, *Emergent and Tunable Toroidal Order and Phase Coexistence in Ferroic Superlattices*, 2018 Conference on Electronic and Advanced Materials (Jan. 2018, Orlando, FL).
18. L. W. Martin, *Emergent Structures and Properties in Ferroelectric Superlattices*, International Symposium on Integrated Functionalities (ISIF) 2017 (Dec. 2017, Delhi, India).
19. L. W. Martin, *Defect-based Routes to Control of Order and Properties in Ferroelectric Thin Films*, Materials Research Society Fall 2017 Meeting (Nov. 2017, Boston, MA).
20. L. W. Martin, *Strain, Defects, and Alloying in BiFeO<sub>3</sub> Thin Films – Towards Structure, Transport, and Magnetism Control*, Materials Research Society Fall 2017 Meeting (Nov. 2017, Boston, MA).
21. L. W. Martin, *Toroidal Order, Phase Coexistence, Electric-Field Control, and Emergent Phenomena in Oxide Superlattices*, IUMRS-ICA 2017 (Nov. 2017, Taipei, Taiwan). **[Keynote]**
22. L. W. Martin, *Emergent Structures and Properties in Ferroelectric Thin Films*, Materials Science and Technology (MS&T) 2017 (Oct. 2017, Pittsburgh, PA).
23. L. W. Martin, *Emergent Phenomena in Ferroic Complex Oxide Thin Films*, Department of Materials Science and Engineering Seminar, University of California, Berkeley (Sept. 2017, Berkeley, CA).
24. L. W. Martin, *Enabling Emergent Ferroic Order in Functional Complex Oxide Thin Films – Beyond Epitaxial Constraint*, 3<sup>rd</sup> Functional Oxide Thin Films for Advanced Energy and Information Technology (July 2017, Rome, Italy).
25. L. W. Martin, *Emergent Structures and Properties in Epitaxial Ferroelectric Thin Films*, 8<sup>th</sup> International Conference on Electroceramics (ICE) 2017 (May 2017, Nagoya, Japan).
26. L. W. Martin, *Controlling Emergent Structures and Properties in Epitaxial Ferroelectric Films*, 2017 Joint ISAF-ISIF-PFM Conference (May 2017, Atlanta, GA).

27. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, Department of Materials Science and Engineering Colloquium, Case Western Reserve University (Apr. 2017, Cleveland, OH).
28. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, Department of Materials Science and Engineering Colloquium, University of Connecticut (Mar. 2017, Storrs, CT).
29. L. W. Martin, *Emergent Phenomena in Functional Complex Oxide Thin Films and Nanostructures*, Advanced Light Source Seminar (Mar. 2017, Berkeley, CA).
30. L. W. Martin, *Emergent Structures and Properties in Ferroic Thin Films - Unlocking New States of Matter*, SLAC THz-UED Science Workshop (Mar. 2017, Palo Alto, CA).
31. L. W. Martin, *Emergent Phenomena at Oxide Interfaces: Electronic Reconstruction Induced Ferromagnetism in a Polar Antiferromagnetic Insulator*, ACerS Electronic Materials and Applications 2017 (Jan. 2017, Orlando, FL).
32. L. W. Martin, *Understanding and Controlling Emergent Ferroic Order in Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, TBSI Materials Symposium (Jan. 2017, Shenzhen, China).
33. L. W. Martin, *Controlling Polarization Profiles, Mesostuctures, and Field-Driven Response in Ferroelectric Thin Films*, 13<sup>th</sup> International Symposium on Ferroic Domains and Micro- to Nano-scopic Structures (ISFD-13) (Oct. 2016, Vancouver, British Columbia, Canada).
34. L. W. Martin, *The Limits of Perfection in Functional Materials*, Emerging Research Opportunities in Ceramics Workshop, National Science Foundation (Sept. 2016, Washington D.C.).
35. L. W. Martin, *Complex Phase Evolution and Coexistence in Polar Vortex Structures*, International Workshop on Topological Structures in Ferroic Materials 2016 (Aug. 2016, Dresden, Germany).
36. L. W. Martin, *Domain Walls and Magnetism in BiFeO<sub>3</sub> – Redux*, International Conferences on Modern Materials and Technologies (CIMTEC) 2016 (June 2016, Perugia, Italy).
37. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, Condensed Matter Seminar, Department of Physics, University of California, Santa Cruz (June 2016, Santa Cruz, CA).
38. L. W. Martin, *Exotic Phenomena in Inhomogeneously-Strained Ferroelectric Films*, Triennial Review for Center for Nanophase Materials Sciences, Oak Ridge National Laboratory (April 2016, Oak Ridge, TN).
39. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, Energy Storage and Distributed Resources Division (ESDR) Seminar, Lawrence Berkeley National Laboratory (April 2016, Berkeley, CA).
40. L. W. Martin, *Domain Structure and Properties in Inhomogeneously-Strained Ferroelectric Thin Films*, American Physical Society (APS) 2016 March Meeting (March 2016, Baltimore, MD).
41. L. W. Martin, *Beyond Conventional Lattice Mismatch Epitaxy: Routes to Enhanced Functionality via Inhomogeneous Strain in Films*, 2016 Lawrence Symposium on Epitaxy (Feb. 2016, Scottsdale, AZ).
42. L. W. Martin, *Pyroelectric and Electrocaloric Effects in Epitaxial Oxide Thin Films*, Taking the Temperature of Phase Transitions in Cool Materials, The Royal Society, London (Feb. 2016, London).
43. L. W. Martin, *Functional Complex Oxide Thin Films and Nanostructures – Designing Next-Generation, High-Performance Materials*, Berkeley Nanosciences and Nanoengineering Institute Seminar Series, University of California, Berkeley (Jan. 2016, Berkeley, CA).
44. L. W. Martin, *Designing Novel Functionalities in Dielectric and Ferroelectric Materials – Compositionally-Graded Thin Film Heterostructures*, ACerS Electronic Materials and Applications 2016 (Jan. 2016, Orlando, FL).
45. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, National Renewable Energy Laboratory (Dec. 2015, Golden, CO).
46. L. W. Martin, *Domain Walls and Magnetism in BiFeO<sub>3</sub> – Redux*, Materials Research Society 2015 Fall Meeting (Dec. 2015, Boston, MA).

47. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Physics and Astronomy, Shanghai Jiao Tong University (Oct. 2015, Shanghai, China).
48. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Physics, Fudan University (Oct. 2015, Shanghai, China).
49. L. W. Martin, *New Horizons in Complex Oxide Thin-Film Growth: Designing Next-Generation, High-Performance Materials*, AVS Topical Conference, 2015 Shanghai Thin Film Conference (Oct. 2015, Shanghai, China). **[Keynote]**
50. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Physics, Shanghai University (Oct. 2015, Shanghai, China).
51. L. W. Martin, *Controlling Next-Generation Ferroic Materials: Domains, Domain Walls, and Ferroic Order in Complex Oxide Thin Films*, Advanced Light Source 2015 User Meeting (Oct. 2015, Berkeley, CA).
52. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Materials Science and Engineering, Carnegie Mellon University (Oct. 2015, Pittsburgh, PA).
53. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films – Designing Next-Generation, High Performance Materials*, Advanced Light Source Seminar (Sept. 2015, Berkeley, CA)
54. L. W. Martin, *New Horizons in Complex Oxide Thin-Film Growth: Designing Next-Generation, High-Performance Materials*, 20<sup>th</sup> American Conference on Crystal growth and Epitaxy (ACCGE-20) (Aug. 2015, Big Sky, MT). **[Plenary]**
55. L. W. Martin, *Designing Next-Generation, High-Performance Functional Oxides for Advanced Devices*, SanDisk Corporation (July 2015, Milpitas, CA).
56. L. W. Martin, *Advanced Thermal-to-Electrical Pyroelectric Energy Conversion*, 2015 Modern Topics in Energy and Power Technical Meeting (July 2015, Army Research Laboratory, Adelphi, MD).
57. L. W. Martin, *Advanced Piezoelectric, Pyroelectric, and Ferroelectric Materials for Powering Smart Systems*, Body Sensors Network Conference – Intelligent Energy Management for Wearable System (June 2015, Boston, MA).
58. L. W. Martin, *Nano- and Macro-Scale Probes of Strain Gradient and Flexoelectric Effects on the Crystal and Domain Structure and Properties of Ferroelectric Thin Films*, 2015 Joint ISAF-ISIF-PFM Conference (May 2015, Singapore).
59. L. W. Martin, *Professor Hans Schmid – Guide to a Renaissance in Multiferroics and Magnetoelectrics*, 2015 Joint ISAF-ISIF-PFM Conference (May 2015, Singapore).
60. L. W. Martin, *Understanding Domain Wall Contributions in Ferroic Systems – Exploring Novel Phenomena in both the Low- and High-Field Regimes*, International Workshop on Topological Structures in Ferroic Materials (May 2015, Sydney, Australia).
61. L. W. Martin, *Designing Next-Generation, High-Performance Materials and Devices – Functional Complex Oxides*, Solid State Technology and Devices Seminar, Department of Electrical Engineering and Computer Science, University of California, Berkeley (April 2015, Berkeley, CA).
62. L. W. Martin, *Enabling New Functionality: Challenges and Opportunities for Integrating Complex Oxides on Silicon*, Workshop on Next Generation Electronics on Silicon – Role of an Academic Silicon Fab (Feb. 2015, Singapore)
63. L. W. Martin, *New Horizons for Strain Control of Ferroelectrics: Manipulating Chemistry and Domain Structures for New Phenomena*, ACerS Electronic Materials and Applications 2015 (Jan. 2015, Orlando, FL).
64. L. W. Martin, *Controlling Advanced Functional Materials – Separating Intrinsic and Extrinsic Effects in Complex Oxides*, AVS 61<sup>st</sup> International Symposium and Exhibition (Nov. 2014, Baltimore, MD).
65. L. W. Martin, *Understanding Domain Wall Contributions to Electric Field and Thermal Response in Ferroelectrics*, 12<sup>th</sup> International Symposium on Ferroic Domains and Micro- to Nanoscopic Structures (ISFD-12) (Nov. 2014, Nanjing, China).

66. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Materials Science and Engineering, University of Science and Technology, Beijing (Oct. 2014, Beijing, China).
67. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Institute of Physics, Chinese Academy of Science (Oct. 2014, Beijing, China).
68. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films: Designing Next-Generation, High-Performance Materials*, Department of Physics Colloquium, Tsinghua University (Oct. 2014, Beijing, China).
69. L. W. Martin, *Controlling Complex Oxide Chemistry to Enable Advanced Dielectric, Ferroelectric, and Electronic Applications*, The International Union of Materials Research Societies International Conference of Young Researchers on Advanced Materials (IUMRS-ICYRAM) (Oct. 2014, Haikou, China).
70. L. W. Martin, *Epitaxial Routes to Control Domain Structures and Properties of Ferroelectric Materials – New Horizons for Strain Control*, XXIII International Materials Research Congress 2014 (Aug. 2014, Cancun, Mexico).
71. L. W. Martin, *New Modalities for and Understanding of Strain Control of Properties in Ferroelectric Thin Films*, Materials Research Society 2014 Spring Meeting (Apr. 2014, San Francisco, CA).
72. L. W. Martin, *Effect of Growth Induced (Non)Stoichiometry on Interfacial Conductance in  $\text{LaAlO}_3/\text{SrTiO}_3$* , American Physical Society March Meeting 2014 (March 2014, Denver, CO).
73. L. W. Martin, *Light-Absorption, Photovoltaic Effects, and Photocatalytic Activity in “Metallic” Oxide Heterostructures*, International Conference on Hydrogen Production 2014 (Feb. 2014, Fukuoka, Japan).
74. L. W. Martin, *Towards Artificial Photosynthesis: The Role of Complex Oxide Materials Science in the Harnessing the Power of the Sun*, Kyushu University, Hydrogen Production Division Seminar (Jan. 2014, Fukuoka, Japan).
75. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films*, Department of Physics Colloquium, Indiana University (Jan. 2014, Bloomington, IN).
76. L. W. Martin, *Next Generation Energy Materials: Challenges in Controlling Complex Oxides for Advanced Applications*, International Conference on Processing and Manufacturing of Advanced Materials, THERMEC' 2013 (Dec. 2013, Las Vegas).
77. L. W. Martin, *Epitaxial Strain in Functional Oxide Thin Films Version 2.0: Engineering Strain Gradients*, Materials Research Society 2013 Fall Meeting (Dec. 2013, Boston, MA).
78. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films*, School of Applied and Engineering Sciences Colloquium, Harvard University (Oct. 2013, Cambridge, MA).
79. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films*, Department of Physics, University of Nebraska, Lincoln (Oct. 2013, Lincoln, NE).
80. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films*, Department of Materials Science and Engineering Seminar, Drexel University (Aug. 2013, Philadelphia, PA).
81. L. W. Martin, *The Science and Engineering of Functional Complex Oxide Thin Films*, Department of Materials Science and Engineering Colloquium, University of Illinois, Urbana-Champaign (Aug. 2013).
82. L. W. Martin, *The Science and Engineering of Magneto-Electro-Thermal Responses of Materials*, International Conference & Exhibition on Advanced & Nano Materials (ICANM 2013), NSF Professional Development Workshop (Aug. 2013, Quebec, Canada).
83. L. W. Martin, *Flexoelectric Effects in Compositionally Graded Ferroelectric Thin Films – Towards Strain 2.0*, IEEE International Symposium on Applications of Ferroelectrics Meeting (July 2013, Prague, Czech Republic).
84. L. W. Martin, *Surfaces and Interfaces in Complex Oxide Electronics*, Physical Electronics Conference 2013 (June 2013, Raleigh, NC).
85. L. W. Martin, *Probing and Controlling Thermal-Electrical Responses in Exotic Ferroelectric Thin Films*, Department of Physics Colloquium, West Virginia University (April 2013, Morgantown, WV).



86. L. W. Martin, *Fundamentals of Complex Oxide Thin-Film Growth and Characterization*, Invited Tutorial, American Physical Society March Meeting 2013 (March 2013, Baltimore, MD).
87. L. W. Martin, *Domain Structures and Switching in Ferroelectric Thin Films*, 12th International Workshop on Piezoresponse Force Microscopy and Nanoscale Electromechanics: Theory, Techniques, and Applications, Oak Ridge National Laboratory (March 2013, Oak Ridge, TN).
88. L. W. Martin, "Mining" Existing Materials for Useful Functionalities – A Material Maker's Perspective, National Science Foundation, Materials By Design II Workshop (Feb. 2013, Arlington, VA).
89. L. W. Martin, *The Science and Engineering of Thermal-Electrical Responses of Materials*, Department of Materials Science and Engineering Colloquium, University of California, Berkeley (Feb. 2013, Berkeley, CA).
90. L. W. Martin, *Enhanced Photocatalysis from Anomalous Light Absorption in the Correlated Oxide Metal SrRuO<sub>3</sub>*, Materials Research Society 2012 Fall Meeting (Dec. 2012, Boston, MA).
91. L. W. Martin, *Unraveling Chemical Complexity at Complex Oxide Heterointerfaces – A Case Study of LaAlO<sub>3</sub>/SrTiO<sub>3</sub>*, 8<sup>th</sup> Annual Minnesota Nanotechnology Workshop (Nov. 2012, Minneapolis, MN).
92. L. W. Martin, *Understanding the Evolution of Complex Phase Structures in Highly-Strained BiFeO<sub>3</sub> Thin Films*, Royal Society of London, Kavli Center Meeting on Magnetoelectrics (Sept. 2012, Milton Keynes, England).
93. L. W. Martin, *Next Generation Energy Materials: Challenges in Controlling Complex Oxides for Advanced Applications*, AVS Prairie Chapter, Materials for Energy Meeting (Sept. 2012, Urbana, IL) **[Plenary]**.
94. L. W. Martin, *Engineering New Phenomena and Functionality in Complex Oxide Thin Film Heterostructures*, SPIE Nanoscience + Engineering, Nanoeptaxy: Materials and Devices (Aug. 2012, San Diego, CA).
95. L. W. Martin, *Unraveling the Complex Phase Evolution in Highly-Strained BiFeO<sub>3</sub> Thin Films: Thickness, Temperature, and Chemical-Alloying Evolution*, Villa Conference on Complex Oxide Heterostructures (April 2012, Orlando, FL).
96. L. W. Martin and William P. King, *Nano-scale Pyro-Electro-Mechanical Electron Source*, Extensible X-Ray Systems and Algorithms for Computed Tomography (EXACT), DARPA/MTO Workshop (April 2012, San Deigo, CA).
97. L. W. Martin, *Enhanced Thermal-Electrical Responses in Ferroelectric Thin Films*, Département de Physique de la Matière Condensée Colloquium, Université de Genève (March 2012, Geneva, Switzerland).
98. L. W. Martin, *Engineering Thermal-Electrical Responses in Complex Oxides: Enhanced Dielectric and Pyroelectric Response in Epitaxially Strained Ferroelectric Thin Films*, Department of Materials Science and Engineering Colloquium, University of Michigan (Jan. 2012, Ann Arbor, MI).
99. L. W. Martin, *Engineering Functional Composites: Large Electromechanical Responses in Highly-Strained BiFeO<sub>3</sub> Thin Films*, Composites at Lake Louise (Oct. 2011, Lake Louise, Alberta, Canada).
100. L. W. Martin, *Engineering New Functionalities in Materials: Large Electromechanical Responses in Highly-Strained BiFeO<sub>3</sub> Thin Films*, Materials Science and Technology 2011 (Oct. 2011, Columbus, OH).
101. L. W. Martin, *Engineering Thermal Properties and Response of Epitaxial Oxide Thin Films for Advanced Devices*, Workshop on Oxide Electronics (Sept. 2011, Napa, CA).
102. L. W. Martin, *Understanding and Manipulating Defects in Complex Oxide Materials – Implications for Properties and Devices*, HP Labs Colloquium (Sept. 2011, Palo Alto, CA).
103. L. W. Martin, *Engineering Thermal-Electrical Responses in Complex Oxides: Enhanced Dielectric and Pyroelectric Response in Epitaxially Strained Ferroelectric Thin Films*, Department of Materials Science and Engineering Colloquium, University of California, Berkeley (Sept. 2011, Berkeley, CA).
104. L. W. Martin, *Engineering New Functionalities in Materials: Complex Oxide Thin Films and Nanostructures for Next Generation Devices*, CNST Annual Nanotechnology and nPEAP Workshop (May 2011, Urbana, IL).

105. L. W. Martin, William King, and David G. Cahill, *Oxide Thin Films for Pyroelectric Energy Conversion*, DoD Interagency Advanced Power Group Meeting (May 2011, Washington, D.C.).
106. L. W. Martin, *Pathway for Enhanced Electromechanical Response via Strain Engineering in Multiferroic BiFeO<sub>3</sub> Thin Films*, Villa Conference on Complex Oxide Heterostructures (April 2011, Las Vegas, NV).
107. L. W. Martin, *Engineering New Functionalities in Materials: Complex Oxides for Multiferroics, Energy, and Beyond*, Department of Materials Science and Engineering Colloquium, North Carolina State University (Feb. 2011, Raleigh, NC).
108. L. W. Martin, *Engineering New Functionalities in Materials: Complex Oxides for Multiferroics, Energy, and Beyond*, Frederick Seitz Materials Research Laboratory Colloquium Series (Feb. 2011, Urbana, IL).
109. L. W. Martin, *Functional Complex Oxide Heterostructures for Energy Conversion*, Electronic Materials and Applications 2011, American Ceramic Society (Jan. 2011, Orlando, FL).
110. L. W. Martin, *Engineering New Functionalities in Materials: Complex Oxides for Multiferroics, Energy, and Beyond*, Department of Materials Science and Engineering Colloquium, Stanford University (Nov. 2010, Palo Alto, CA).
111. L. W. Martin, *Multiferroic Heterostructures for Novel Functionalities*, Materials Science and Technology 2010 (Oct. 2010, Houston, TX).
112. L. W. Martin, *Oxide Materials for Energy Applications*, 2010 Gordon Conference in Solid State Studies in Ceramics (Aug. 2010, New London, NH).
113. L. W. Martin, *Understanding and Controlling Defects in BiFeO<sub>3</sub>*, Argonne National Laboratory Workshop on the Analysis and Control of Defects in Complex Oxides (July 2010, Argonne, IL).
114. L. W. Martin, *Multifunctional Composites – Engineering New Functionalities with Multiferroics*, Composites at Lake Louise (Oct. 2009, Lake Louise, Alberta, Canada) [**Plenary**].
115. L. W. Martin, *Intrinsic and Extrinsic Interfaces in Oxides – Towards Next Generation Nanoelectronics*, Center for Integrated Nanotechnologies User's Conference, (Sept. 2009, Santa Fe, NM).
116. L. W. Martin, *Multifunctional Oxide Thin Films: Engineering Functionality in Materials*, Department of Materials Science and Engineering Seminar, Pennsylvania State University (Feb. 2009, State College, PA).
117. L. W. Martin, *Multifunctional Oxide Thin Films: Engineering Functionality in Materials*, Department of Materials Science and Engineering Seminar, University of Pennsylvania (Feb. 2009, Philadelphia, PA).
118. L. W. Martin, *Multifunctional Oxide Thin Films: Engineering Functionality in Materials*, Helios Seminar, Helios Solar Energy Research Center, Lawrence Berkeley National Laboratory (Jan. 2009, Berkeley, CA).
119. L. W. Martin, *Multifunctional Oxide Thin Films: Engineering Functionality in Materials*, Department of Materials Science and Engineering Seminar, Drexel University, (Jan. 2009, Philadelphia, PA).
120. L. W. Martin, *Multifunctional Oxide Thin Films: Engineering Functionality in Materials*, Department of Materials Science and Engineering Seminar, University of Illinois, Urbana-Champaign (Jan. 2009, Urbana, IL).
121. L. W. Martin, *Multiferroic Physics: Engineering New Functionalities in Materials*, Emerging Research Materials for Spin Logic Workshop hosted by International Technology Roadmap for Semiconductors (Nov. 2008, Austin, TX).
122. L. W. Martin, *Engineering New Functionalities with Multiferroics: Electrical Control of Magnetism*, Materials Science and Technology 2008 (Oct. 2008, Pittsburgh, PA).
123. L. W. Martin, *New Functionality with Multiferroic Materials: Electrically Tunable Magnetism*. Materials Research Society 2007 Fall Meeting (Dec. 2007, Boston, MA).
124. L. W. Martin, *Electric Field Control of Magnetism Using Multiferroics*. SSRL/LCLS User's Meeting and Workshop (Oct. 2007, Menlo Park, CA).
125. L. W. Martin, *Electrically Tunable Magnetism: Functionality with Multiferroics*. 14th Semiconducting and Insulating Materials Conference (May 2007, Fayetteville, AR).
126. L. W. Martin, *Investigations of Multiferroic Complex Oxides*, Materials Science and Technology (Oct. 2006, Cincinnati, OH).

127. L. W. Martin, *Growth and Properties of a New Perovskite Thin Film – PbVO<sub>3</sub>*. Materials Research Society Spring 2006 Meeting Graduate Student Award Session (April 2006, San Francisco, CA) (Gold Medal Award Winning Talk).

#### DEPARTMENTAL ACTIVITIES

##### **Teaching**

*UC Berkeley (July 2014 – Present)*

1. MSE 45 (formerly ENG 45) and MSE 45L (formerly ENG 45L) – Properties of Materials (Fall 2015, Fall 2016, Fall 2017)
2. MSE 296A/B (Fall 2017, Spring 2018)
3. MSE 117/217 – Properties of Dielectric and Magnetic Materials (Spring 2017)
4. MSE 104 – Materials Characterization (Spring 2015, Spring 2016)

*UIUC (Aug. 2009 – July 2014)*

5. MSE 280 – Engineering Materials (Spring 2010, 2011, Fall 2011)
6. MSE 422 – Electrical Ceramics (Fall 2010, Spring 2012, Spring 2013, Spring 2014)
7. MSE 423 – Ceramics Processing Laboratory (Fall 2013)
8. MSE 529 – Hard Materials Seminar (Created course and taught jointly with J. Zuo Fall 2011)
9. MSE 595 – Department Colloquium (Spring 2011, Fall 2011)

##### **Committees and Services**

##### **Department**

*UC Berkeley (July 2014 – Present)*

1. Graduate Admissions and Fellowships (Chair - AY2014-2015, AY2015-2016, AY2016-2017, AY2017-2018)
2. Undergraduate Recruiting Committee (AY2016-2017, AY2017-2018)
3. Preliminary Examination Committee (Phase Diagrams – Jan. 2015, Aug. 2017; Characterization – Aug. 2015, Elect./Mag./Opt. Props. – Jan. 2016, Jan. 2018)
4. Undergraduate Curriculum Committee (Chair AY2018-2019, Member AY2015-2016, AY2016-2017, AY2017-2018)
5. Academic Affairs and Graduate Curriculum Committee (AY2015-2016, AY2016-2017)
6. 5<sup>th</sup> Year B.S./M.S. Major Field Advisor (AY2017-2018, AY2018-2019)
7. Chief Undergraduate Advisor (AY2018-2019)

*LBNL (July 2014 – Present)*

8. Materials Science Division LDRD Review and Selection Committee (Spring 2016, 2017, 2018)

*UIUC (Aug. 2009 – July 2014)*

9. Colloquium Series (Spring 2011, Fall 2011)
10. Curriculum Committee (AY 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014)
11. Engineering Open House (AY 2009-2010, 2010-2011)
12. Safety Committee (AY 2009-2010)
13. Undergraduate Recruitment (AY 2009-2010, 2010-2011; Head of Committee 2011-2012, 2012-2013, 2013-2014)
14. Graduate Recruitment (AY 2009-2010, 2010-2011)

##### **College**

*UC Berkeley (July 2014 – Present)*

15. Undergraduate Studies Committee (UC Berkeley) (AY 2014-2015, AY2015-2016, AY2016-2017, AY2017-2018, AY2018-2019)

*UIUC (Aug. 2009 – July 2014)*

16. Materials Research Laboratory Facilities Committee (UIUC) (AY 2010-2011, 2011-2012, 2012-2013, 2013-2014)
17. Materials Research Laboratory Safety Committee (UIUC) (Faculty Lead AY 2012-2013, 2013-2014)
18. Materials Research Laboratory Director Five Year Review Committee (UIUC) (Spring 2012)
19. Search Committee, Coordinator of Undergraduate Research (UIUC) (F2013-S2014)

### University

UC Berkeley (July 2014 – Present)

20. Non-Ionizing Radiation Safety Committee (UC Berkeley) (S2015-present)

21. GSI Advisory Committee (Graduate Division) (F2017-present)

UIUC (Aug. 2009 – July 2014)

22. Envisioning Future Excellence Workshop (2012)

23. Envisioning Future Excellence, Information and Technology Workshop (2013)

24. University of Illinois, Office of Technology Management Advisory Board (2012-present)

### PROFESSIONAL ACTIVITIES

1. Frequent reviewer for ACS Applied Materials and Interfaces, ACS Nano, Acta Materialia, Advanced Functional Materials, Advanced Materials, Applied Physics A, Applied Physics Letters, APL Materials, Applied Surface Science, Chemistry of Materials, Crystal Growth and Design, CrystEngComm, Current Opinions in Solid State and Materials Science, Europhysics Letters, IEEE Journal of Photovoltaics, IEEE Transactions on Magnetics, Journal of Alloys and Compounds, Journal of the American Ceramics Society, Journal of Applied Physics, Journal of Electroceramics, Journal of Materials Chemistry C, Journal of Nanomaterials, Journal of Physical Chemistry, Journal of Physics D – Applied Physics, MRS Proceedings, Materials Chemistry and Physics, Materials Science and Engineering B, Nano Letters, Nanotechnology, Nature, Nature Communications, Nature Materials, NPG Asia Materials, Philosophical Magazine Letters, Physica A and B, Physica Status Solidi A, Physical Chemistry Chemical Physics, RSC Advances, Science, Science Advances, Scientific Reports, Smart Materials and Structures, Solid State Sciences, Surfaces and Coating Technology, Thin Solid Films, and more.
2. Chair, User Executive Committee and *Ex Officio* Member of Scientific Advisory Board, Center for Nanophase Materials Science (CNMS), Oak Ridge National Laboratory (ORNL) (Jan. 2017 – Jan. 2018)
3. Vice-Chair, User Executive Committee, Center for Nanophase Materials Science (CNMS), Oak Ridge National Laboratory (ORNL) (Jan. 2016 – Jan. 2017)
4. International Advisory Board, International Workshop on Topological Structures in Ferrioc Materials (Feb. 2017 – Present).
5. Symposium and Meeting Organizer
  - a. Symposium Organizer, *Domain Engineering in Ferrioc Systems: From fundamental sciences to novel applications*, XIX International Materials Research Congress, August 2010, Cancun, Mexico.
  - b. Focus Topic Organizer, *Magnetic Oxide Thin Films Focus Topic*, 2011 March Meeting of the American Physical Society, Dallas, TX.
  - c. Symposium Organizer, *Multiferroics and Ferroelectrics*, 2011 Fall Meeting of the Materials Research Society, Nov. 2011, Boston, MA.
  - d. Symposium Organizer, *Nanocomposites, Nanostructures, and Heterostructures of Correlated Oxide Systems*, 2012 Spring Meeting of the Materials Research Society, April 2012, San Francisco, CA (co-organized with Japan Society of Applied Physics).
  - e. Symposium Organizer, *Domain Engineering in Ferrioc Systems*, XXI International Materials Research Congress, August 2012, Cancun, Mexico.
  - f. Conference Organizer, *Workshop on Oxide Electronics XXI*, Sept. 2014, Lake George, NY.
  - g. Conference Organizer, *7<sup>th</sup> International Conference on Electroceramics, ICE2015*, Conference Organizer, May 2015, State College, PA.
  - h. Conference Organizer, *CNMS Users Meeting*, Aug. 2016, Oak Ridge, TN.
  - i. Symposium Organizer, *Epitaxy of Complex Oxides*, 21<sup>st</sup> American Conference on Crystal Growth and Epitaxy (ACCGE-21), July-Aug. 2017, Santa Fe, NM.
  - j. Conference Organizer (Lead), *Joint CNMS/SNS User Meeting*, Aug. 2017, Oak Ridge, TN.
  - k. Conference Organizer, *Workshop on Oxide Electronics XXIV*, Sept. 2017, Chicago, IL.
  - l. Program Committee, *2018 Lawrence Symposium on Epitaxy*, Feb. 2018, Scottsdale, AZ.
6. Programmatic reviewer for:
  - a. AAAS (INDO-US Science and Technology Forum)
  - b. Academy of Finland

- c. Army Research Office
- d. ARPA-E
- e. Chilean Comisión Nacional de Investigación Científica y Tecnológica (CONICYT)
- f. Deutsche Forschungsgemeinschaft (German Research Foundation)
- g. Environmental Molecular Science Laboratory Capability Development Program, Pacific Northwest National Laboratory
- h. King Abdulaziz University
- i. Maryland Industrial Partnerships Program (MIPS), Technical Program Review
- j. National Science Foundation (Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program; Division of Materials Research, Condensed Matter Physics; DMREFs; Office of International Science and Engineering, International Research Fellowship Program; Directorate for Engineering, Civil, Mechanical, and Manufacturing Innovation, Advanced Manufacturing, Materials Processing and Manufacturing; Directorate for Engineering, Civil, Mechanical, and Manufacturing Innovation, Materials and Surface Engineering; Office of International Science and Engineering; Division of Materials Research, Electronic and Photonic Materials)
- k. Stanford Synchrotron Radiation Lightsource
- l. Swiss National Science Foundation
- m. U.S. Department of Energy (Basic Energy Sciences; Early Career Award; Solar Energy Technologies Program, SunShot Initiative; US-India Clean Energy Research and Development Centers; Graduate Student Fellowship Program)
7. Member of the Center for Nanoscale Materials (CNM) at Argonne National Laboratory Proposal Evaluation Board (March 2010 – Aug. 2012)
8. Member of the Center for Nanoscale Materials (CNM) at Argonne National Laboratory Proposal Evaluation Board (March 2010 – Aug. 2012)
9. Member of the Center for Nanophase Materials Science (CNMS) at Oak Ridge National Laboratory (ORNL) Review Committee (April 2014 – Present)
10. Committee Member, Materials Research Society's Discovering Breakthroughs Inside Science (DBIS) Committee (May 2006 – May 2009).
11. Member, Strategic Programing Planning Subcommittee (SPPS), Materials Research Society (Nov. 2010 – 2011)

#### GRADUATE AND POSTDOCTORAL ADVISEES

**Current Graduate Advisees:** Megha Acharya, Arvind Dasgupta, Abel Fernandez, Ran Gao, Yizhe Jiang, Jieun Kim, Eduardo Lupi, Sahar Saremi, Gabriel Velarde

**Current Postdoctoral Advisees:** Anirban Ghosh, Derek Meyers, David Pesquera, Lei Zhang, Wenbo Zhao

**Former Students and Postdocs:** Joshua C. Agar (Ph.D., 2015 and PD), Brent A. Apgar (M.S., 2016), Christoph Baeumer (M.S., 2013), Eric Breckenfeld (Ph.D., 2014), Zuhuang Chen (PD), Anoop R. Damodaran (Ph.D., 2014 and PD), Liv Dedon (M.S., 2014), Karthik Jambunathan (Ph.D., 2013), Sungki Lee (Ph.D., 2014), Chen-Wei Liang (PD), Vengadesh Mangalam (PD), Jarrett Moyer (PD), Shishir Pandya (Ph.D., 2018), Ruijuan Xu (Ph.D., 2018), Jialan Zhang (PD) [11 graduated M.S./Ph.D. total; 7 postdocs total]