Vitae of Michael F. Toney
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Education

- NATO Postdoctoral Fellow, Risø National Laboratory, Roskilde, Denmark. 1983-1984
- Ph.D. (1983), M.S. (1980) in physics, University of Washington, Seattle, WA
- B.S. in physics with honors, 1979, California Institute of Technology, Pasadena, CA

Experience

- Professor of Chemical and Biological Engineering, University of Colorado Boulder, 2020-present
- Adjunct Professor of Materials Science and Engineering, Stanford, 2019- 2020
- Distinguished Staff Scientist. Stanford Synchrotron Radiation Lightsource, 2014-2020
- Head SSRL Materials Sciences Division, 2010-2020.
- Chemistry and Materials Sciences Staff (CAMS) group leader, 2009-2019
- Senior Staff Scientist. Stanford Synchrotron Radiation Lightsource, 2007-2014
- Staff Scientist. Stanford Synchrotron Radiation Laboratory, 2003-2007
- Research Staff Member, IBM Almaden Research Center, 1984-2003
- Office of the Laboratory Director, IBM Almaden Research Center, San Jose, 1993-1994
- NATO Postdoctoral Fellow, Risø National Laboratory, Roskilde, Denmark. 1983-1984
- Research Associate, University of Washington, Seattle, Wa. 1979-1983
- Undergraduate Research Staff, California Institute of Technology, Pasadena, 1978-1979
- Teaching Assistant, California Institute of Technology, Pasadena, Ca. 1978-1979.

Honors and Awards

- American Physical Society Fellow, 2019.
- Thomson Reuters Highly Cited Researcher from 2014 to present.
- Farrell W Lytle Award for fostering collaboration between SSRL users and staff, Stanford Synchrotron Radiation Lightsource, 2009
- SLAC National Accelerator Laboratory Employee Recognition Award, Sept 2009.
- IBM Research Division Award, 1999. For development of giant magnetoresistance head technology.
- IBM Outstanding Technical Achievement Award, 1997. For measurements of the near-surface orientation of polymer molecules.
- IBM Technical Group Award, 1996. For progress in understanding the molecular arrangement of water near electrified interfaces.
- IBM Outstanding Technical Achievement Award, 1988. For *in-situ* measurements of the structure of adsorbed monolayers at immersed electrodes.
- IBM Research Division Award, 1988. For contributions for solving hard disk drive contamination problems.
- IBM First Patent Application Achievement Award, 1988.
- NATO Postdoctoral Fellowship, 1983

- University of Washington Graduate Tuition Scholarship, 1983
- American Vacuum Society Scholarship, 1980 and 1981
- Sebastian Karrer Prize in Physics (University of Washington), 1980
- California Institute of Technology Merit Scholarship, 1978

Recent Select Conferences and Workshops Organized

- Co-organize the symposium on Advances in Electron, X-ray and Neutron Spectro-imaging/Holography of Energy Materials and Devices at the Microscopy & Microanalysis 2018 Meeting in August.
- Organized "SSRL School on Hard X-ray Scattering: Techniques in Materials and Environmental Sciences," at SSRL, May 16-17, 2006; May 15-17, 2007; June 1-3, 2010, May 29-31, 2012, June 3-5, 2014, 2016.
- Co-organize Synchrotron Radiation in Polymer Science 5, San Francisco, March 30-April 1, 2012.
- Co-organized Materials Research Society Symposium on "Materials in Transition ─Insights from Synchrotron and Neutron Sources", Boston, Ma 2007.
- Organized and co-chaired the 31st SSRL Users Meeting, Oct 20-22, 2004.

Selected Professional Activities

- Member of International Advisory Board for Center for Innovative Energy (CiNE), Campinas Brazil.
- Panel lead for DOE Basic Research Needs for Energy Storage, 2017.
- Member of Expert Committee Review (Energy Materials) for the Canada Foundation for Innovation. Jan 26, 27, 2017.
- Member of review Committee for Brookhaven National Laboratory Condensed Matter Physics and Materials Sciences Division, March 2014.
- Member of External Advisory Board of Center for Electrochemical Energy Storage Energy Frontier Research Center, 2013 - present.
- Member of ChemMatCars (Advanced Photon Source Sector 15) Science Advisory Committee, 2011-2014.
- Member (2007-present) and Chair (2009-2010) of Advanced Photon Source (APS) Scattering Applied Materials Proposal Review Panel (PRP).
- Member of the Conceptual Design Review Committee for the NEXT (NSLS-II Experimental Tools) project at NSLS-II, 2011.
- Member of the University of Chicago Argonne Review Committee for the Photon Science Directorate (PSD) and the Advanced Photon Source (APS) at Argonne National Laboratory (ANL), 2010.
- Member of NIST Center for Neutron Research Beam Time Allocation Committee, 2005 - 2010.
- Member DOE sponsored meeting on "Research frontiers in artificially structured magnets and nanomagnetism at neutron scattering facilities", 9/30-31/2001.
- Member of DOE Workshop on Chemical Interactions at Metal Oxide-Aqueous Solution Interfaces, April, 1997.
- Chair of the committee to assess the future of X-ray science at the Stanford Synchrotron Radiation Laboratory, 1993-1994.

- Chair (1992) and member (1991) for a review panel of the DOE University Research Instrumentation Program.

Recent Select Invited Talks at Conferences and Meetings – from over 100

- "Cycling in Li Metal Anodes – Structure and Morphology", Fall 2019 American Chemical Society National Meeting, Aug 26, 2019.
- "X-rays Show How Sustainable Energy Materials Function: Solid-Electrolyte Interface Layers", 10th International Conference on. Materials for Advanced Technologies, Singapore, June 25, 2019
- "Phonons and Hybrid Metal-Halide Perovskites", Structural & electronic dynamics in soft semiconductors, Weizmann Institute for Science, Israel, Feb 5, 2019.
- "Morphology in organic photovoltaics: Importance of intimately mixed donor/acceptor domains", 7th Synchrotron Radiation in Polymer Science, 2018, Gyeongju, Korea. Sept 4, 2018.
- "Electrode-Electrolyte Interfaces in Energy Conversion and Storage", Spring ACS National Meeting, Boston, Aug 20, 2018.
- "Morphology in organic photovoltaics: Importance of intimately mixed donor/acceptor domains", Spring ACS National Meeting, New Orleans, March 21, 2018
- "Interfaces in Electrochemical Energy Storage", APS March Meeting, March 5th, 2018.
- "Structure and Ion Transport in Energy Storage Systems", 21st International Conference of Solid State Ionics, Padau, Italy, June 19, 2017.
- "Integrating Theory and Experiment to Understand and Control Reaction Pathways", 231st ECS Spring Meeting. New Orleans, May 30, 2017.
- "Morphology in organic photovoltaics probed by grazing incidence X-ray scattering", GISAXS, Hamburg, Germany, Oct 16, 2016.
- "Operando X-ray Diffraction of $CH_3NH_3PbI_3$ Solar Cells", International Summit on Hybrid Organic Photovoltaic Stability-8, Rio de Janeiro, Brazil, Sept 30, 2015.
- "Relationship between Morphology & Photophysics in Organic Photovoltaics", Sixth Annual SU2P Symposium, St Andrews, Scotland, Mar 23, 2015.
- "Understanding How Batteries Really Work: Insight from *Operando* Investigations", AAAS 2015 Annual Meeting, Jan 13, 2015.

Select Recent Invited Talks at Universities and Laboratories –from over 70

- "Observing Crystallization Pathways In situ", Diamond Light Source Seminar, Harwell, UK, July 2, 12019.
- "Time Scales in Methylammonium Lead Iodide Perovskite Solar Absorbers", Seminar, Cavendish Laboratory, University of Cambridge, July 5, 2019.
- "X-rays Show How Sustainable Energy Materials Function: In situ and Operando Investigations", Materials Sciences and Engineering Seminar, Technion University, Haifa, Israel, Feb 11, 2019.
- "Time Scales in Methylammonium Lead Iodide Perovskite Solar absorbers", Paul Sherrer Institute, Switzerland, Oct 4, 2018.
- "Observing Crystallization Pathways In situ", Sustainable Energy Technologies Department Seminar, Brookhaven National Lab, Dec 1, 2017.

- "Mechanistic Insights into Energy Storage from X-ray Scattering", Oxford, UK, May 3, 2017.
- "Mechanistic Insights into Energy Storage from X-ray Scattering and Spectro-Microscopy", Materials Sciences and Engineering Colloquium, Stanford University, Feb 3, 2017.
- "Mechanistic Insights into Energy Storage from X-ray Scattering", Argonne National Laboratory, Materials Sciences and Chemical Sciences Divisions Joint Colloquium, 1/12/2017.
- "Formation and operation of organic-inorganic lead halide perovskite solar absorbers", UC Berkeley Materials Sciences Colloquium, Nov 10, 2016.
- "Formation and operation of organic-inorganic halide perovskite solar absorbers" Materials Sciences Distinguished Lecture, Colorado School of Mines, March 24, 2016
- "Structure in Photovoltaic Thin Films", UC Berkeley Nanoscience and Engineering Seminar, March 13, 2015.
- "Role of structure and morphology in organic electronics", University of California, Santa Barbara, Materials Sciences seminar, Jan 7, 2015.
- "Role of Additives in Morphology Evolution of Bulk Heterojunction Photovoltaics", CSIRO Monash University, Melbourne, Australia, Jan 30, 2014.
- "Watching Energy Storage Materials in Operation: In-Situ Synchrotron Radiation Studies", PARC Electronic Device Materials Laboratory Seminar, PARC, Mar 15, 2013.
- "Role of structure and morphology in organic electronics", Northwestern University, May 22, 2012.
- "The role of morphology in organic solar cells", IBM Almaden Research Center Colloquium, San Jose, Ca. Oct 7, 2011.
- "Morphology in organic photovoltaic materials", Victoria University of Wellington, New Zealand, Feb 15, 2011.

Complete Publications list.

1. "NASICON $Na_3V_2(PO_4)_3$ Enables Quasi-Two-Stage Na+ and Zn2+ Intercalation for Multivalent Zinc Batteries", JS Ko, PP Paul, G Wan, N Seitzman, RH DeBlock, BS Dunn, MF Toney, Johanna Nelson Weker, Chem Mater, . DOI: 10.1021/acs.chemmater.0c00004
2. "Emerging X-ray imaging technologies for energy materials", C. Cao, M.F. Toney, T.-K. Sham, R. Harder, P.R. Shearing, X. Xiao, J. Wang, Mater Horz., in press. DOI: 10.1016/j.mattod.2019.08.011
3. "Hybrid Nanostructured $Ni(OH)_2$/NiO for High-Capacity Lithium-Ion Battery Anodes", Y Ren , J.S. Ko, R.M. Kasse, X. Song , M.F. Toney, J. Nelson Weker, J. Electrochem. En. Conv. Stor. **17** , 041107 (2020). DOI 10.1115/1.4046491
4. "High-capacity thermochemical CO_2 dissociation using iron-poor ferrites", S Zhai, J Rojas, N Ahlborg, K. Lim, C Hon, M Cheng, C. Xie, MF Toney, I-H Jung, WC Chueh, A. Majumdar, Ener Environ Sci, 2020. DOI: 10.1039/C9EE02795E
5. "Using resonant energy X-ray diffraction to extract chemical order parameters in ternary semiconductors", RR Schnepf, BL Levy-Wendt, MB Tellekamp, BR Ortiz, CL Melamed, LT Schelhas, KH Stone, MF Toney, ES Toberer, AC Tamboli, J Mater Chem C, (2020). DOI: 10.1039/C9TC06699C

6. “Inducing Molecular Aggregation of Polymer Semiconductors in a Secondary Insulating Polymer Matrix to Enhance Charge Transport”, S. Nikzad, H-C Wu, J Kim, C.M. Mahoney, J.R. Matthews, WN Yang Li, H Wang, W-C Chen, MF Toney, M He, Z Bao, Chem Mater. In press (2020). DOI: 10.1021/acs.chemmater.9b05228
7. “Synthesis of Poly(bisisoindigo) Using a Metal-Free Aldol Polymerization for Thin-Film Transistor Applications”, A Ganguly, K He, AD Hendsbee, M Abdelsamie, RN Bennett, Y Li, M.F. Toney, TL Kelly, ACS Appl. Mater. Inter. **12**, 14265−14271 (2020). DOI: 10.1021/acsami.9b23064
8. “Structural and spectral dynamics of single-crystalline Ruddlesden-Popper phase halide perovskite blue light-emitting diodes”, H Chen, J Lin, J Kang, Q Kong, D Lu, J Kang, M Lai, LN Quan, Z Lin, J Jin, L-W Wang, MF Toney, P Yang, Sci. Adv. 6, **eaay4045** (2020), DOI: 10.1126/sciadv.aay4045
9. “Subsurface Cooling Rates and Microstructural Response during Laser Based Metal Additive Manufacturing”, V. Thampy, A.Y. Fong, N.P. Calta, J. Wang, A.A. Martin, P.J. Depond, A.M. Kiss, G. Guss, Q. Xing, R.T. Ott, A. van Buuren, M.F Toney, J. Nelson Weker, M.J. Kramer, M.J. Matthews, C.J. Tassone, K.H. Stone, Sci. Repts. **10**:1981 (2020). DOI: 10.1038/s41598-020-58598-z
10. “Molecular Orientation for Vapor-Deposited Organic Glasses Follows 2 Rate-Temperature Superposition: The Case of Posaconazole”, C. Bishop, Y. Li, M.F. Toney, L. Yu, M. D. Ediger, J. Phys. Chem. B **124**, 2505−2513 (2020). 10.1021/acs.jpcb.0c00625
11. “Toward quantifying capacity losses due to solid electrolyte interphase evolution in silicon thin film batteries”, H.-G. Steinrück, C. Cao, G.M. Veith, M.F. Toney, J. Chem. Phys. **152**, 084702 (2020). DOI: 10.1063/1.5142643
12. “Structural Origins of Light-Induced Phase Segregation in Organic-Inorganic Halide Perovskite Photovoltaic Materials”, RE Beal, N Zhou Hagstrom, J Barrier, A Gold-Parker, R. Prasanna, K.A. Bush, D. Passarello, L.T. Schelhas, K. Bruning, C.J. Tassone, H-G Steinruck, M.D. McGehee, M.F. Toney, Ana Flavia Nogueira, Matter **2**, 207-219 (2020). DOI: 10.1016/j.matt.2019.11.001
13. “Size-Dependent Lattice Structure and Confinement Properties in $CsPbI_3$ Perovskite Nanocrystals: Negative Surface Energy for Stabilization”, Q Zhao, A. Hazarika, LT Schelhas, J. Liu, E.A. Gaulding, G. Li, Mi. Zhang, M.F. Toney, P.C. Sercel, J.M. Luther, ACS Energy Lett. **5**, 238−247 (2020). DOI: 10.1021/acsenergylett.9b02395
14. “Fine-Tuning Semiconducting Polymer Self-Aggregation and Crystallinity Enables Optimal Morphology and High-Performance Printed All-Polymer Solar Cells”, Y. Wu, S. Schneider, C. Walter, A.H. Chowdhury, B. Bahrami, H.-C. Wu, Q. Qiao, M.F. Toney, Z. Bao, J Amer Chem Soc, **142**, 392-406 (2020). DOI: 10.1021/jacs.9b10935
15. “Li gradients for Li-rich cathodes”, M.F. Toney, Nature Ener. **4**,–1015 (2019). DOI: 10.1038/s41560-019-0522-z
16. “Generic packing motifs in vapor-deposited glasses of organic semiconductors”, K. Bagchi, A. Gujral, M.F. Toney, M.D. Ediger, Soft Mater. **15**, 7590-7595 (2019). DOI: 10.1039/c9sm01155b
17. “Confined Interlayer Water Promotes Structural Stability for High-Rate Electrochemical Proton Intercalation in Tungsten Oxide Hydrates”, J.B. Mitchell, N.R. Geise, A.R. Paterson, N.C. Osti, Y Sun, S. Fleischmann, R Zhang, L.A. Madsen, M.F. Toney, D-e Jiang, A.I. Kolesnikov, E. Mamontov, V. Augustyn, ACS Energy Lett. **4**, 2805-2812 (2019). DOI: 10.1021/acsenergylett.9b02040

18. “Effect of extensional flow on the evaporative assembly of a donor-acceptor semiconducting polymer”, S. Nikzad, H.-C. Wu, G.-J N. Wang, H. Yan, S.A. Schneider, M.F. Toney, Z. Bao, ACS Appl. Electron. Mater. **1**, 2445-2454 (2019). DOI: 10.1021/acsaelm.9b00576
19. “Acceptor Gradient Polymer Donors for Non-Fullerene Organic Solar Cells”, A.L. Jones, Z. Zheng, P. Riley, I. Pelse, J. Zhang, M. Abdelsamie, M.F. Toney, S.R. Marder, F. So, J.-L. Brédas, J.R. Reynolds, Chem. Mater. **31**, 9729-9741 (2019). DOI: 10.1021/acs.chemmater.9b03327
20. “Tuning the bandgap of $Cs_2AgBiBr_6$ through dilute tin alloying”, K.P. Lindquist, S.A. Mack, A.H. Slavney, L. Leppert, A. Gold-Parker, J.F. Stebbins, A. Salleo, M.F. Toney, J.B. Neaton, H.I. Karunadasa, Chem. Sci., **10**, 10620 (2019). DOI: 10.1039/c9sc02581b
21. “Laser-induced Keyhole Defect Dynamics During Metal Additive Manufacturing”, AM Kiss, AY Fong, NP Calta, V Thampy, AA Martin, PJ Depond, J Wang, MJ Matthews, RT Ott, CJ Tassone, KH Stone, MJ Kramer, A van Buuren, MF Toney, J Nelson Weker, Adv. Eng. Mater. 1900455 (2019). DOI: 10.1002/adem.201900455
22. “Advanced X-ray Scattering and Spectroscopy Characterization of an Antisoiling Coating for Solar Module Glass”, S.L. Moffitt, R.A. Fleming, C.S. Thompson, C.J. Titus, E. Kim, L. Leu, M.F. Toney, L.T. Schelhas, ACS Appl. Energy Mater. **2**, 7870-7878 (2019). DOI: 10.1021/acsaem.9b01316
23. “Pressure Induced Semiconductor to Metal Phase Transition of a Charge-Ordered Indium Halide Perovskite”, J Lin, H Chen, Y Gao, Y Cai, J Jin, A.S. Etman, J Kang, T Lei, Z Lin, M.C. Folgueras, L.N Quan, Q Kong, M Sherburne, M Asta, J Sun, M.F. Toney, J Wu, P Yang, Proc. Nation. Acad. Sci. **116**, 23404-23409 (2019). DOI: 10.1073/pnas.1907576116
24. “Synthesis of Polycrystalline Ruddlesden-Popper Organic Lead Halides and Their Growth Dynamics”, RF Moral, LG Bonato, JC Germino, WX Coelho Oliveira, R Kamat, J Xu, CJ. Tassone, S.D Stranks, M.F. Toney, Ana Flavia Nogueira, Chem. Mater. **31**, 9472−9479 (2019). DOI: 10.1021/acs.chemmater.9b03439
25. “Vapor deposition of a nonmesogen prepares highly structured organic glasses”, C. Bishop, J.L. Thelen, E Gann, M.F. Toney, L Yu, D.M. DeLongchamp, M.D. Ediger, Proc Nation. Acad. Sci. **116**, 21421-21426DOI: 10.1073/pnas.1908445116
26. “Zn_2SbN_3: growth and characterization of a metastable photoactive semiconductor”, E. Arca, J.D. Perkins, S. Lany, A. Mis, B.-R. Chen, P. Dippo, J.L. Partridge, W. Sun, A. Holder, A.C. Tamboli, M.F. Toney, L.T. Schelhas, G. Ceder, W. Tumas, G Teeter, A. Zakutayev, Mater. Horiz. **6**, 1669 (2019). DOI: 10.1039/c9mh00369j
27. “Analysis and simulation of One-dimensional Transport Models for Lithium Symmetric Cells”, A Subramaniam, J. Chen, T. Jang, N.R. Geise, R.M. Kasse, M.F. Toney, V.R. Subramanian, J Electrochem. Soc. **166**, A1-A14 (2019). DOI: 10.1149/2.0261915jes
28. “Shedding X-ray Light on the Interfacial Electrochemistry of Silicon Anodes for Li-Ion Batteries”, C. Cao, B. Shyam, J. Wang, M.F. Toney, H.-G. Steinrück, Accts Acc. Chem. Res. **31**, 1562-1572 (2019). DOI: 10.1021/acs.accounts.9b00233
29. “Augmenting n-Type Performance of Ambipolar Top-Contact Organic Thin-Film Transistors by Self-Generated Interlayers”, T Sarkar, J Vinokur, B Shamieh, V Savikhin, MF Toney, GL Frey, Chem Mater. **31**, 7046−7053 (2019). DOI: 10.1021/acs.chemmater.9b01787
30. “Morphology of Organic Semiconductors Electrically Doped from Solution Using Phosphomolybdic Acid”, T-Y Huang, FA Larrain, CH Borca, C Fuentes-Hernandez, H

Yan, SA Schneider, W-F Chou, VA Rodriguez-Toro, H-G Steinrück, C Cao, CD Sherrill, B Kippelen, MF Toney, Chem Mater. **31** 6677−6683 (2019). DOI: 10.1021/acs.chemmater.9b01069

31. "Robust and Stretchable Polymer Semiconducting Networks - From Film Microstructure to Macroscopic Device Performance", G Zhang, S Lee, E Gutierrez-Meza, Cn Buckley, M McBride, DA Valverde-Chavez, Y-H Kwon, V Savikhin, H Xiong, TJ Dunn, MF Toney, Z Yuan, C Silva, E Reichmanis, Chem Mater. **31**, 6530−6539 (2019). DOI: 10.1021/acs.chemmater.8b05224
32. "Ptychography of Organic Thin Films at Soft X-ray Energies", V. Savikhin, D.A. Shapiro, X Gu, S.D. Oosterhout, M.F. Toney, Chem Mater. **31**, 4913−4918 (2019). DOI: 10.1021/acs.chemmater.9b01690
33. "Copper(I)-Based Highly Emissive All-Inorganic Rare-Earth Halide Clusters", J Lin, H Chen, J Kang, L.N. Quan, Z Lin, Q Kong, M Lai, S Yu, L Wang, L-W Wang, MF Toney, P. Yang, Matter **1**, 180–191 (2019). DOI: 10.1016/j.matt.2019.05.027
34. "Vapor-Deposited Glass Structure Determined by Deposition Rate−Substrate Temperature Superposition Principle", C Bishop, A Gujral, MF Toney, L Yu, MD Ediger, J Chem Phys Lett **10**, 3536−3542, (2019). DOI:10.1021/acs.jpclett.9b01377
35. "Polyimide-PEG Segmented Block Copolymer Membranes with High Proton Conductivity by Improving Bicontinuous Nanostructure of Ionic Liquid-Doped Films", E Woo, E Coletta, A Holm, J Mun, MF Toney, DY Yoon, CW Frank, Macromol. Chem. Phys. **220**, 1900006 (2019). DOI: 10.1002/macp.201900006
36. "A map of the inorganic ternary metal nitrides", W Sun, C.J. Bartel, E. Arca, S.R. Bauers, B. Matthews, B. Orvañanos, B-R Chen, M.F. Toney, L.T. Schelhas, W Tumas, J. Tate, A Zakutayev, S Lany, A.M. Holder, G Ceder, Nature Mater. **18**, 732–739 (2019). DOI: 10.1038/s41563-019-0396-2
37. "Dynamics of pore formation during laser powder bed fusion additive manufacturing", A Martin, N Calta, S Khairallah, J Wang, P DePond, A Fong, V Thampy, G Guss, A Kiss, KH Stone, CJ Tassone, J Weker, MF Toney, T van Buuren, M Matthews, Nature Comm. **10**, 1987 (2019). DOI: 10.1038/s41467-019-10009-2
38. "Ultrafast narrowband exciton routers enable low-loss luminescent solar concentrators", M. Wei, F. P. García de Arquer, G. Walters, Z. Yang, L.N. Quan, Y. Kim, R. Sabatini, R. Quintero-Bermudez, L. Gao, J.Z. Fan, F. Fan, A. Gold-Parker, M.F. Toney, E.H. Sargent, Nature Ener. **4,** 197–205 (2019). DOI: 10.1038/s41560-018-0313-y
39. "Chemical Evolution of CoCrMo Wear Particles: an In-Situ Characterization Study", MA Koronfel, AE Goode, MA Gomez-Gonzalez, J Nelson Weker, Johanna; TA Simões, R Brydson, P Quinn, MF Toney, A Hart, AE Porter, MP Ryan, J. Phys. Chem. C **123**, 9894-9901 (2019). DOI: 10.1021/acs.jpcc.9b00745
40. "Pathways for Practical High-Energy Long-Cycling Lithium Metal Batteries", J Liu, Z Bao, Y Cui, E Dufek, J Goodenough, P Khalifah, Q Li, B Liaw, P Liu, A Manthiram, Y Meng, V Subramanian, MF Toney, V Viswanathan, MS Whittingham, J Xiao, W Xu, J Yang, X-Q Yang, J-G Zhang, Nat. Energy **4**, 180-186 (2019). DOI: 10.1038/s41560-019-0338-x
41. "Solid Electrolyte Interphase on Native Oxide-Terminated Silicon Anodes for Li-Ion Batteries", C. Cao, I.I. Abate, E. Sivonxay, B. Shyam, C. Jia, B. Moritz, T.P. Devereaux, K.A. Persson, H.-G. Steinruck, M.F. Toney, Joule **3**, 762-781 (2019). DOI: 10.1016/j.joule.2018.12.013

42. “Higher Mobility and Carrier Lifetimes in Solution-Processable Small-Molecule Ternary Solar Cells with 11% Efficiency”, R-Z Liang, Y. Zhang, V. Savikhin, M. Babics, Z. Kan, M. Wohlfahrt, N. Wehbe, S. Liu, T. Duan, M.F. Toney, F. Laquai, P.M Beaujuge, Adv. Ener. Mater. **9**, 1802836 (2018). DOI: 10.1002/aenm.201802836
43. “Designing a Quinone-Based Redox Mediator to Facilitate Li2S Oxidation in Li-S Batteries”, Y. Tsao, M. Lee, E.C. Miller, G. Gao, J. Park, S. Chen, T. Katsumata, H Tran, L.-W. Wang, M.F. Toney, Y. Cui, Z. Bao, Joule **3**, 872-884, (2019) DOI: 10.1016/j.joule.2018.12.018
44. “Metal-Oxygen Decoordination Stabilizes Anion Redox in Li-rich Oxides”, J. Hong, W.E. Gent, P. Xiao, Kipil Lim, D-H Seo, J Wu, P.M. Csernica, C.J. Takacs, D. Nordlund, C.-J Sun, K.H. Stone, D. Passarello, W. Yang, D. Prendergast, G. Ceder, M.F. Toney, W.C. Chueh, Nature Mater **18**, 256–265 (2019). DOI: 10.1038/s41563-018-0276-1
45. “Hydrogen Purification in Palladium-Based Membranes: An Operando X-ray Diffraction Study”, M. Yuan, K. Lee, D.G. Van Campen, S. Liguori, M.F. Toney, J. Wilcox, Ind. Eng. Chem. Res. **58**, 926-934 (2019). DOI: 10.1021/acs.iecr.8b05017
46. “Fullerene derivative induced morphology of bulk heterojunction blends: PIPCP:$PC_{61}BM$”, T-Y Huang, H Yan, M Abdelsamie, V Savikhin, S.A. Schneider, N.A. Ran, T.-Q. Nguyen, G. C. Bazan, M.F. Toney, RSC Adv. **9**, 4106 (2019). DOI: 10.1039/c8ra10488c
47. “Origin of Anisotropic Molecular Packing in Vapor-Deposited Alq3 Glasses”, K Bagchi, N.E. Jackson, A. Gujral, C. Huang, M.F. Toney, L. Yu J.J. de Pablo, M.D. Ediger, J. Phys. Chem. Lett. **10**, 164–170 (2019). DOI: 10.1021/acs.jpclett.8b03582
48. “Theory-guided Sn/Cu alloying for efficient CO_2 electro-reduction at low overpotentials”, X. Zheng, Y. Ji, J. Tang, J. Wang, B. Liu, H.-G. Steinrück, K. Lim, Y. Li, M.F. Toney, K. Chan, Y. Cui, Nature Catal. **2**, 55–61 (2019). DOI: 10.1038/s41929-018-0200-8
49. “Selective brookite polymorph formation related to the amorphous precursor state in TiO_2 thin films”, J.S. Mangum, O. Agirseven, J.E.S. Haggerty, J.D. Perkins, L.T. Schelhas, D.A. Kitchaev, L.M. Garten, D.S. Ginley, M.F. Toney, J. Tate, B.P. Gorman, J. Non-Cryst. Solids **505**, 109–114 (2019). DOI: 10.1016/j.jnoncrysol.2018.10.049
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