**Gabriel M. Veith**

**Senior Research Scientist**

**Team Lead**

Oak Ridge National Laboratory

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Highlights

217 peer-reviewed publications

4 Book Chapters

11 Patents (6 submitted)

120 Invited Presentations

Early Career Award (ORNL)

Significant Event Awards (ORNL)

Chemistry Teaching Award (2)

Supervised 12 post-docs

Supervised 17 students

4 Dissertations supervised

R&D 100 Awards (2015, 2017)

h-index = 66

Q-Clearance

Funding

$7.3M/3 years

Profile

Materials chemist focused on understanding solid-liquid interfaces and their effect on electrochemical and catalytic properties

Experience

Joint Faculty - University of Tennessee (2020-)

Research Scientist, Oak Ridge National Laboratory; Oak Ridge, TN; 2008-2012

Associate Research Scientist, Oak Ridge National Laboratory; Oak Ridge, TN; 2005-2008

Post-doctoral Researcher, Oak Ridge National Laboratory; Oak Ridge, TN; 2002-2005

Research Assistant, Naval Research Laboratory, Washington, DC; 1996-1997

Education

Ph.D. Inorganic Chemistry, Rutgers University, Piscataway, NJ (May 2002)

Thesis title: “Investigations of B-site Substituted Ruddlesden-Popper Type Compounds for Enhanced Magnetoresistance”

Thesis Advisor: Professor Martha Greenblatt

B.S. Chemistry, George Mason University, Fairfax, VA (1993-1997)

Professional Activities

Associate Editor – *Catalyst*

Argonne CNM Evaluation Board Member

Scientific Organizing Committee – Gold 2012, ECS2019

Advisory Board – Ohio State Engineering School

Program lead silicon anodes

Electrochemical Society Battery Division Representative

Subject matter expert microbatteries for DARPA and others

Awards

R&D 100 Award (2015, 2017)

Significant Event Award (2013, 2015, 2017)

Battelle Early Career Scientific Achievement (2008)

**Summary of Research Highlights and Interests**

**Energy Storage**

* Expert in liquid-solid interface chemistry of lithium ion batteries.
* Lead the development of methods to apply neutron scattering and spectroscopy to investigate battery materials *in situ*
* Developed tools and approaches to understand and mitigate gassing from batteries
* Invented shear thickening electrolytes to change design paradigms for lithium ion battery safety and performance
* Expert in solid-state batteries and isotopically enriched batteries
* Expanded tools and equipment to fabricate air-sensitive electrode materials to characterize the fundamental interface and transport properties
* Lead ORNL’s metal air battery programs
* World expert in sodium ion battery anode chemistry
* Panelist, DOE-BES Basic Research Needs for Next Generation Electrical Energy Storage

**Catalysis**

* Expert in understanding how the liquid phase synthesis of a catalytic nanoparticle (1) changes the surface chemistry of an oxide support material and (2) how these changes affect gas phase catalytic activity.
* Developed new synthesis technique, based on magnetron sputtering, enabling deposition of high purity nanoparticles on any vacuum stable support without the use chemical contaminates associated with solution deposition methods.
* Developed processes to prepare solid acid fuel cell electrocatalysts.
* Lead ORNL’s efforts on the Nitrogen Economy

**Materials Synthesis**

* Lead Materials Chemistry program on materials synthesis science
* Developed neutron scattering cells to follow materials growth *in situ*

**Functional Materials**

* Co-developed corrosion resistant materials which saved the US. Air Force $2B/20years in maintenance.
* Developed high temperature alloys for molten salt reactors and understanding interfaces

**Mentor/Supervisor (not including team members in group)**

*Directly supervised and supported post-doctoral researchers*

Rebecca McAuliffe (2018 - present)

M. Katie Burdette (2018 – present)

Kevin Hays (2016 – 2018)

Zhijang Tang (2017 - 2018)

Wesley Tennyson (2016 - 2017)

Loic Baggetto (2011-2014)

*Co-mentored and supported post-doctoral researcher*

Thomas Malkowski – (2018 – present, Joint with Nancy Dudney)

Jiuhun Kim (2018 – present, Joint with James Browning)

Bohang Song (2016 – 2019, Joint with Ashfia Huq)

Charl J. Jafta (2016 – 2019, Joint with Craig Bridges)

Joshua Kim (2016-2017, Joint with James Browning)

Pasquale Fulvio (2012-2015, Joint with Sheng Dai)

*Graduate Students directly supported and supervised*

Ethan Boeding – University of Tennessee (current student)

Charlie Nguyen – University of Tennessee (graduate student - 2019)

Katie L. Browning – University of Tennessee (graduation 2019)

Nathan Phillip – University of Tennessee (graduation 2019)

Brian H. Shen – University of Rochester (graduation 2018)

Jonathan Powell – University of Tennessee (graduation 2017)

*Graduate students co-advised with extensive times in my laboratories*

Mallory Clites (Drexel, 2018)

Jaclyn Coyle (UC Boulder, 2016-2018)

Michael Klein (UT Austin, 2016-2017)

Anna Windmuller (Julich, 2017)

Thorsten Reppert (Julich 2016-2017)

Tyler Fears (Missouri Science and Technology, 2014-2015)

Marie Guinn (Julich, 2016)

Thomas Hardy (Massachusetts Institute of Technology, 2012-2013)

Ethan Crumlin (Massachusetts Institute of Technology, 2011-2013)

*Students, Interns, Visitors – Directly supported and supervised*

Ph.D Level - Francisco Bonilla (CIC- Energune), Nagore Ortiz Vitoriano (CIC- Energune),

Post BS Level- Christopher Bruneau, Katie Browning, TJ Christensen, Kun Lou, Gokul Nair, Alan Pezeshki, Alexander Rodgers, Nicolette Sanders, Claire Seitzinger, Elizabeth Terranova, Neyanel Vasquez-Garcia

Undergraduate Level - Thomas Colburn, Ian Greely, Samantha Hawk, Joseph Singh

Peer Reviewed Publications (*Newest to Oldest – Grouped by Subject) -* 217 total + 8 submitted

**Batteries and Electrochemistry**

120. “Examining CO2 as an Additive for Solid Electrolyte Interphase Formation on Silicon Anodes”, Emma J. Hopkins, Sarah Frisco, Ryan T. Pekarek, Caleb Stetson, Zoey Huey, Steven Harvey, Xiang Li, Baris Key, Chen Fang, Gao Liu, Guang Yang, Glenn Teeter, Nathan R. Neale, Gabriel M. Veith, *Submitted Journal of the Electrochemical Society* (2021).

119. “Probing clustering dynamics between silicon and PAA or LiPAA slurries under processing conditions” Mary K. Burdette-Trofimov, Beth L. Armstrong, Ryan P. Murphy, Luke Heroux, Mathieu Doucet, Alexander Rogers, Gabriel M. Veith, *Submitted Macromolecules* (2021).

118. “Understanding the origin of the non-passivating behaviour of Si-based anodes during the initial cycles” Elisabetta Arca, Gabriel M. Veith, Terri Lin, Glenn Teeter, Robert Kostecki, *Submitted Energy & Environmental Sciences* (2021).

117. La3Zr2Ox nanoparticles allow for the synthesis of pure Li-ion superconducting garnet. Robert L Sacci, Thomas Malkowski, Nathan Kidder, X. Chelsea Chen, Ashfia Huq, Melanie Kirkham, Rebecca McAuliffe, Beth L. Armstrong, Gabriel M. Veith, Luke L Daemen, *Submitted*, *Journal of the American Ceramic Society* (2021).

116. "Sterically-Stabilized Shear Thickening Nanoparticle Electrolytes: XPCS Microrheology and Rheology" Weiping Liu, Bingqian Zheng, Xuechen Yin, Xiaoxi; Yu, Yugang Zhang, Lutz Wiegart, Andrei Fluerasu, Beth Armstrong, Gabriel M. Veith, Surita Bhatia, *Submitted – ACS Applied Materials & Interfaces* (2021)

115. “An Anode-Free Li Metal Cell with Replenishable Li Designed for Long Cycle Life” Haodong Liu, John Holoubek, Hongyao Zhou, Zhaohui Wu, Xing Xing, Sicen Yu, Gabriel M.Veith, Yejing Li, Meng Hu, Yoonjung Choi, Ping Liu, *Energy Storage Material* 36 (4), pg 251-256(2021).

114. “Distilling Nanoscale Heterogeneity of Amorphous Silicon using Tip-enhanced Raman Spectroscopy (TERS) via Multiresolution Manifold Learning" Guang Yang, Xin Li, Yongqiang Cheng, Mingchao Wang, Dong Ma, Alexei P. Sokolov, Sergei V. Kalinin, Gabriel M. Veith, Jagjit Nanda, *Nature Communications,* 12(1), pg 578*-*589 (2021)

113. “Elucidating Interfacial Stability between Lithium Metal Anode and LiPON via In Situ Electron Microscopy” Zachary D. Hood, Xi Chen, Robert L. Sacci, Gabriel M. Veith, Xiaoming Liu,

Yifei Mo, Junjie Niu, Nancy J. Dudney, Miaofang Chi, *Nano Letters,* 21(1), pg. 151–157(2021) 10.1021/acs.nanolett.0c03438

112. “Direct Measure of Electrode Spatial Heterogeneity: Influence of Processing Conditions on Anode Architecture and Performance” M.K. Burdette, B. L. Armstrong, Johanna Nelson Weker, Alexander M. Rogers, Guang Yang, Ethan C. Self, Ryan R. Armstrong, Jagjit Nanda, Gabriel M. Veith, *ACS Applied Materials & Interfaces*, 12(50), pg. 55954–55970 (2020).

111. “Electrochemical Reactivity and Passivation of Silicon Thin-Film Electrodes in Organic Carbonate Electrolytes” Ivana Hasa, Atetegeb M. Haregewoin, Liang Zhang, Jinghua Guo, Gabriel M. Veith, Philip N. Ross, Robert Kostecki, *ACS Applied Materials & Interfaces,* 12(36), pg. 40879–40890(2020)

110. “Ending the Chase for a Perfect Binder: Role of Surface Chemistry Variation and its Influence on Silicon Anodes” Kevin A. Hays, Beth Armstrong, Gabriel M. Veith, *ChemElectroChem,* 7(18), pg 3790-3797 (2020).

109. M. K Burdette-Trofimov, Beth L. Armstrong, Alexander Rogers, Luke Heroux, Mathieu Doucet, Guang Yang, Nathan Phillip, Michelle Kidder, Gabriel M. Veith, “Understanding binder-silicon interactions during slurry processing” *Journal of Physical Chemistry C,* 124(24), pg 13479-13494 (2020).

108. Goldilocks and the three glymes: how Na+ solvation controls Na-O2 battery cycling

N. Ortiz Vitoriano, I. Ruiz de Larramendi, R.L. Sacci, I. Lozano, C.A. Bridges, O. Arcelus, M. Enterría, J. Carrasco, T. Rojo, G.M. Veith *Energy Storage Materials*, 29(1), pg. 234-245 (2020).

107. “Investigation on Capacity Loss Mechanisms of Lithium-ion Pouch Cells Under Mechanical Indentation Conditions” Xiaoqing Zhu, Srikanth Allu, Ercan Cakmak, Yanfei Gao, Emma J Hopkins, Gabriel M Veith, Zhenbo Wang, Hsin Wang, *Journal of Power Sources* 465, pg 228314 (2020).

106. “Intrinsic Chemical Reactivity of Solid-Electrolyte Interphase Components in Silicon-Lithium Alloy Anode Batteries Probed by FTIR Spectroscopy”Ryan T. Pekarek, Alec Affolter, Lauryn L. Baranowski, Jaclyn Coyle, Tingzheng Hou, Eric Sivonxay, Brenda A. Smith,Rebecca D. McAuliffe, Kristin A. Persson, Baris Key, Christopher Apblett, Gabriel M. Veith, Nathan R. Neale, *Journal of Materials Chemistry A,* **8**(16), pg. 7897-7906(2020).

105. “Investigating the Chemical Reactivity of Lithium Silicate Model SEI Layers” Jaclyn E Coyle, Michael T Brumbach, Christopher A Apblett, Gabriel M Veith, Conrad R Stoldt, *Journal of Physical Chemistry C,* 15, 8153-8161(2020).

104. “Role of Surface Acidity on the Surface Stabilization of the High Voltage Cathode LiNi0.6Mn0.2Co0.2O2” Nathan D. Phillip, Beth L. Armstrong, Claus Daniel, Gabriel M. Veith, *ACS Omega*, 5, 25, 14968–14975 (2020).

103. “Intrinsic Chemical Reactivity of Silicon Electrode Materials: Gas Evolution” Claire L. Seitzinger, Robert L. Sacci, Jaclyn E. Coyle, Christopher A. Apblett, Kevin A. Hays, Ryan R. Armstrong, Alexander M. Rogers, Beth L. Armstrong, Nathan R. Neale, Gabriel M. Veith, *Chemistry of Materials,* 32, 7, 3199-3210(2020).

102.” "Influence of Binder Coverage on Interfacial Chemistry of Thin Film LiNi0.6Mn0.2Co0.2O2 Cathodes" Nathan D. Phillip, Claus Daniel, Gabriel M. Veith, *Journal of the Electrochemical Society,* 167, 040621(2020)

101. “Structural Degradation of High Voltage NMC Cathodes in Solid-State Batteries and Implications for Next Generation Energy Storage", Nathan D. Phillip, Andrew W. Westover, Claus Daniel, Gabriel M. Veith, *ACS Applied Energy Materials*, 3(2), 1768-1774(2020).

100.. “Towards quantifying capacity losses due to solid electrolyte interphase evolution in silicon thin film batteries” Hans-Georg Steinrück,Chuntian Cao, Gabriel M. Veith, Michael F. Toney, *The Journal of Chemical Physics*, 152, 084702 (2020).

99. "The Study of the Binder Polyacrylic Acid and its Role in Concomitant Solid-Electrolyte Interphase Formation on Si Anodes", Katie L. Browning, Robert L. Sacci, Mathieu Doucet, James F. Browning, Joshua Kim, Gabriel M. Veith, *ACS Materials and Interfaces,* 12(8), 10018-10030(2020).

98. “Dynamic Lithium Distribution upon Dendrite Growth and Shorting Revealed by Operando Neutron Imaging” Bohang Song, Indu Dhiman, John C. Carothers, Gabriel M. Veith, Jue Liu, Hassina Z. Bilheux, Ashfia Huq¸*ACS Energy Letters,* 4(10), pg. 2402–2408 (2019).

97. “High‐Voltage Performance of Ni‐Rich NCA Cathodes: Linking Operating Voltage with Cathode Degradation” Lamuel David, Debasish Mohanty, Linxiao Geng, Rose E Ruther, Athena S Sefat, Ercan Cakmak, Gabriel M Veith, Harry M Meyer III, Hsin Wang, David L Wood III, ChemElectroChem, 6(22), pg. 5571-5580 (2019).

96. “Role of conductive binder to direct solid–electrolyte interphase formation over silicon anodes”

Katie L. Browning, James F. Browning, Mathieu Doucet, Norifumi L. Yamada, Gao Liu, Gabriel M. Veith, *Physical Chemistry Chemical Physics*, 21(31), pg 17356-17365 (2019).

95. “Unraveling the Nanoscale Heterogeneity of Solid Electrolyte Interphase Using Tip-Enhanced Raman Spectroscopy” Jagjit Nanda, Guang Yang, Tingzheng Hou, Dmitry N Voylov, Xin Li, Rose E Ruther, Michael Naguib, Kristin Persson, Gabriel M Veith, Alexei P Sokolov, *Joule*, 3(8) pg 2001-2019(2019)*.*

94. “[Interpreting Electrochemical and Chemical Sodiation Mechanisms and Kinetics in Tin Antimony Battery Anodes using in situ TEM and Computational Methods](https://scholar.google.com/scholar?oi=bibs&cluster=1724414473164185562&btnI=1&hl=en)” Jacob Gutiérrez-Kolar, Loïc Baggetto, Xiahan Sang, Dongwon Shin, Vitaliy Yurkiv, Farzad Mashayek, Gabriel M Veith, Reza Shahbazian-Yassar, Raymond R Unocic, *ACS Applied Energy Materials*, 2(5) 3578-3586 (2019).

93. “Probing Microstructure and Electrolyte Concentration Dependent Cell Chemistry via *operando* Small Angle Neutron Scattering” Charl J. Jafta, Xiao-Guang Sun, Gabriel M. Veith, Grethe V. Jensen, Shannon M. Mahurin, Mariappan P. Paranthaman, Sheng Dai, Craig A. Bridges, *Energy and Environmental Sciences*, 12(6)1866-1877 (2019).

92. "Understanding the Low-Voltage Hysteresis of Anionic Redox in Na2Mn3O7” B. H. Song M. Tang, E. Hu, E.; Borkiewicz, O. J.; Wiaderek, K. M.; Zhang, Y.; Phillip, N. D.; Liu, X.*;* Shadlike, Z.; Li, C.; Song, Y-Y. Hu, M. Chi, Gabriel M. Veith, X-Q. Yang, J. Liu, J. Nanda, K. Page, A. Huq*,* *Chemistry of Materials* **31** (10), 3756-3765 (2019).

91. “Synthesis of Ni-Rich Thin-Film Cathode as Model System for Lithium Ion Batteries” Nathan D. Phillip, Rose E. Ruther, Xiahan Sang, Yongqiang Wang, Raymond R. Unocic, Andrew S. Westover, Claus Daniel, Gabriel M. Veith, *ACS Applied Energy Materials*, 2(2) pg 1405-1412 (2019).

90. "Probing Electrolyte Solvents at Solid/Liquid Interface using Gap-Mode Surface-Enhanced Raman Spectroscopy" Guang Yang, Robert L. Sacci, Ilia N. Ivanov, Rose E. Ruther, Yiman Zhang, Pengfei Cao, Gabriel M. Veith, Nancy J. Dudney, Tomonori Saito, Daniel Hallinan, Jagjit Nanda, *Journal of the Electrochemical Society,*  166(2), A178-A187 (2019).

89. “Metastable Li1+δMn2O4 (0 ≤ δ ≤ 1) Spinel Phases Revealed by in Operando Neutron Diffraction and First-Principles Calculations” Bohang Song, Gabriel M. Veith, Jinseon Park, Mina Yoon, Pamela S. Whitfield, Melanie J. Kirkham, Jue Liu, and Ashfia Huq, *Chemistry of Materials,* 31(1), pg 124-134(2019).

88.  “Silicon Surface Tethered Polymer as Artificial Solid Electrolyte Interface” Brian H. Shen, Gabriel M. Veith, Wyatt E. Tenhaeff, *Nature Scientific Reports*, **8**, 11549 (2018).

87. “Resolving the amorphous structure of lithium phosphorus oxynitride (Lipon)” Valentina Lacivita, Andrew Westover, Andrew Kercher, Nathan Phillip, Guang Yang, Gabriel M. Veith, Gerbrand Ceder, Nancy Dudney*, Journal of the American Chemical Society* 140(35), pg 11029–11038(2018).

86.  “Si Oxidation and H2 Gassing During Aqueous Slurry Preparation for Li ion Battery Electrodes” Kevin A. Hays, Baris Key, Jianlin Li, David L. Wood III, Gabriel M. Veith, *Journal of Physical Chemistry C*, 122(18) 9746-9754 (2018).

85. "Shear Thickening Electrolyte Built from Sterically Stabilized Colloidal Particles" Brian Shen, Beth L. Armstrong, Mathieu Doucet, Luke Heroux, James F. Browning, Michael Agamalian, Michael; Wyatt E. Tenhaeff, Gabriel M. Veith, *ACS Materials and Interfaces*, 10 (11), pp 9424–9434 (2018).

84. “Predictive design of shear-thickening electrolytes for safety considerations” Brian H. Shen, Gabriel M. Veith, Beth L. Armstrong, Wyatt E. Tenhaeff, Robert L. Sacci, *Journal of the Electrochemical Society*, 164(12) pg A2547-A2551 (2017)

83. “A Sodium-Aluminum Hybrid Battery” Xiao-Guang Sun, Zhizhen Zhang, Hongyu Guang, Craig A. Bridges, Youxing Fang, Yong-Sheng Hu, Gabriel M. Veith, Sheng Dai, *Journal of Materials Chemistry A,* 5(14), pg 6589-6596 (2017).

82.  “Shear Thickening Electrolytes for High Impact Resistant Batteries” Gabriel M. Veith, Beth L. Armstrong, Hsin Wang, Sergiy Kalnaus, Wyatt Tenhaeff, Mary Patterson, *ACS Energy Letters* 2(9), pg 2084-2088 (2017).

81. “Chemistry of sputter-deposited lithium sulfide films” Michael J. Klein, Gabriel M. Veith, Arumugam Manthiram, *Journal of the American Chemical Society,* 139(31), pp 10669–10676 (2017).

80. "Lithium Malonatoborate Additives Enabled Stable Cycling of 5 V Lithium Metal and Lithium Ion Batteries" *Nano Energy,* 40 (1), pg 9-19 (2017).

79. “Lithium Vanadium Oxide (Li1.1V3O8) Coated with Amorphous Lithium Phosphorous Oxynitride (LiPON): Role of Material Morphology and Interfacial Structure on Resulting Electrochemistry” Qing Zhang, Andrew K. Kercher, Gabriel M. Veith, Varun Sarbada, Alexander B. Brady, Jing Li, Eric A. Stach, Robert Hull, Kenneth J. Takeuchi, Esther S. Takeuchi, Nancy J. Dudney, Amy C. Marschilok, *Journal of The Electrochemical Society*, 164 (7), pg. A1503-A1513 (2017)

78. "Impact of Fluorination on Phase Stability, Crystal Chemistry, and Capacity of LiCoMnO4 High Voltage Spinels", Anna Windmüller, Craig A. Bridges, Chih-Long Tsai, Sandra Lobe, Christian Dellen, Gabriel M. Veith, Martin Finsterbusch, Sven Uhlenbruck, Oliver Guillon, *ACS Applied Materials & Interfaces*, 1(2), pg 715-724 (2018).

77. “Synthesis, Electrochemical, and Structural Investigations of Oxidatively Stable Li2MoO3 and xLi2MoO3•(1-x)LiMO2 Composite Cathodes" Ethan Self, Jagjit Nanda, Feng Wang, Rose Ruther, Chongmin Wang, Gabriel Veith, Lianfeng Zou, Ming-Jian Zhang, Ashfia Huq, Bohang Song, Richard Opfer, *Chemistry of Materials* 30(15), pg 5061–5068 (2018).

76. “Aromatic Polyimide/Graphene Composite Organic Cathodes for Fast and Sustainable Lithium-Ion Batteries” Hailong Lyu, Peipei Li, Jiurong Liu, Shannon Mahurin, Jihua Chen, Dale K. Hensley, Gabriel M. Veith, Zhanhu Guo, Sheng Dai, and Xiao-Guang Sun, *Chem Sus Chem* 11(4), pg 763-772) 2018.

75. “Neutron Vibrational Spectroscopic Studies of Novel Tire-Derived Carbon Materials “ Yunchao Li, Yongqiang Cheng, Luke L. Daemen, Gabriel M. Veith, Alan M. Levine, Richard J. Lee, Shannon M. Mahurin, Sheng Dai, Amit K. Naskar, Mariappan Parans Paranthaman,  *Physical Chemistry Chemical Physics,* 19(33), pg 22256-22262 (2017).

74. “Determination of the solid electrolyte interphase structure grown on a silicon electrode using a fluoroethylene carbonate additive” Gabriel M. Veith, Mathieu Doucet, Robert L. Sacci, Bogdan Vacaliuo, J. Kevin Baldwin, James F. Browning, *Nature Scientific Reports* 7, Article 6326 (2017).

73. “Rational Design of lithium-sulfur battery cathodes based on experimentally determined maximum active material thickness”, Michael J. Klein, Gabriel M. Veith, Arumugam Manthiram, Journal of the American Chemical Society, 139 (27), pg. 9229–9237 (2017).

72. “Lithium transport in an amorphous LixSianode investigated by quasi-elastic neutron scattering” Robert L. Sacci, Michelle L. Lehmann, Souleymane O. Diallo, Yongqiang Q. Cheng, Luke L. Daemen, James F. Browning, Mathieu Doucet, Nancy J. Dudney, Gabriel M. Veith, Journal of Physical Chemistry C, 121(21), pg 11083-11088 (2017).

71. “Energetics of Na+ transport through the electrode/cathode interface in single solvent electrolytes” Katie L. Browning, Robert L. Sacci, Gabriel M. Veith, Journal of the Electrochemical Society, 164(4), pg A580-A586 (2017).

70. “A Novel Electrolyte Salt Additive for Lithium Ion Batteries with Voltages Greater Than 4.7 V” Yunchao Li, Shun Wan, Gabriel M. Veith, Raymond R. Unocic, Mariappan Parans Paranthaman, Sheng Dai, and Xiao-Guang Sun *Advanced Functional Materials,* 1601397 (2016).

69. “The Cell-in-Series Method: A Technique for Accelerated Electrode Degradation in Redox Flow Batteries”, AM Pezeshki, RL Sacci, GM Veith, TA Zawodzinski, MM Mench, *Journal of the Electrochemical Society,* 163(1)*,* pg A5202-A5210 (2016).

68. “Evaluating the solid electrolyte interphase formed on silicon electrodes: A comparison of *ex situ* X-ray photoelectron spectroscopy and *in situ* neutron reflectometry” T. Fears, M. Doucet, J. Browning, J. Baldwin, J. G. Winiarz, H. Kaiser, H. Taub, R. L. Sacci and G. M. Veith*, Phys. Chem. Chem. Phys.* 18(20), pg 13927-13940 (2016). DOI: 10.1039/C6CP00978F

67. “Elucidating the Phase Transformation of Li4Ti5O12 Lithiation at the Nanoscale” M. G. Verde, L. Baggetto, N. Balke, G. M. Veith, J. K. Seo, Z. Wang, Y. S. Meng, *ACS Nano* 10(4), pg 4312-4321(2016).DOI: 10.1021/acsnano.5b07875

66. “Conduction Below 100 °C in Nominal Li6ZnNb4O14”, Y. Li, M. P. Paranthaman, L. W. Gill, E. W. Hagaman, Y. Wang, A. P. Sokolov, S. Dai, C. Ma, M. Chi, G. M. Veith, A. Manthiram, and J. B. Goodenough, J. Mater. Sci., 51(2) Pg. 854-860 (2016).

65. “Polymerized Ionic Networks with High Charge Density: Quasi-Solid Electrolytes in Lithium-Metal Batteries” Pengfei Zhang, Mingtao Li, Bolun Yang, Youxing Fang, Xueguang Jiang,

Gabriel M. Veith, Xiao-Guang Sun, and Sheng Dai, *Advanced Materials*, 27(48), pg 8088-8094 (2015).

64. “Probing battery chemistry with liquid cell electron energy loss spectroscopy” Raymond R. Unocic, Loıc Baggetto, Gabriel M. Veith, Jeffery A. Aguiar, Kinga A. Unocic, Robert L. Sacci, Nancy J. Dudney, Karren L. More, *Chemistry Communications* 51(91), pg 16377-16380 (2015).

63. “Role of Precursor Chemistry in the Direct Fluorination of Titanium Based Conversion Anodes for Lithium-Ion Batteries” Jonathan M. Powell, Jamie Adcock, Sheng Dai, Gabriel M. Veith, Craig A. Bridges, *RSC Advances,* 5(108), pg. 88876-88885 (2015).

62. "A POM-Organic Framework Anode for Li-Ion Battery" Yanfeng Yue, Yunchao Li, Zhonghe Bi, Gabriel M. Veith, Craig A. Bridges, Bingkun Guo, Jihua Chen, David R. Mullins, Sumedh P. Surwade, Shannon M. Mahurin, Hongjun Liu, M. Parans Paranthaman, and Sheng Dai, *Journal of Materials Chemistry A*, 3(45) pg. 22989-22995 (2015).

61. “A study of perfluorocarboxylate ester solvents for lithium ion battery Electrolytes” Tyler M. Fears, Robert L. Sacci, Jeffrey G. Winiarz, Helmut Kaiser, Haskell Taub, Gabriel M. Veith, *Journal of Power Sources*, 291(1), pg 434-442 (2015).

60. “Understanding the Role of NH4F and Al2O3 Surface Co-modification on Lithium-Excess Layered Oxide Li1.2Ni0.2Mn0.6O2” Haodong Liu, Danna Qian, Michael G. Verde, Minghao Zhang, Loïc Baggetto, Ke An, Yan Chen, Kyler J. Carroll, Derek Lau, Miaofang Chi, Gabriel M. Veith, Ying Shirley Meng, *ACS Applied Materials and Interfaces*, 7(34), pg 19189-19200 (2015).

59. “Direct Determination of Solid-Electrolyte Interphase Thickness and Composition as a Function of State of Charge on a Silicon Anode” Gabriel M. Veith, Mathieu Doucet, John Baldwin, Robert L. Sacci, Tyler M. Fears, Yongqiang Wang, James F. Browning, *Journal of Physical Chemistry C,* 119 (35), pg. 20339–20349 (2015).

58. “Correlating local structure with electrochemical activity in Li2MnO3”, Rose E. Ruther, Hemant Dixit, Alan M. Pezeshki, Robert L. Sacci, Valentino R. Cooper, Jagjit Nanda, Gabriel M. Veith, *Journal of Physical Chemistry C*, 119 (32), pg. 18022–18029 (2015).

57. “Lithium salts for advanced lithium batteries: Li–metal, Li–O2, and Li–S”, Reza Younesi, Gabriel M. Veith, Patrik Johansson, Kristina Edström, Tejs Vegge, *Energy and Environmental Science*, 8(7), pg 1905-1922 (2015).

56. “High performance electrodes in vanadium redox flow batteries through oxygen-enriched thermal activation” Alan M. Pezeshki, Jason T. Clement, Gabriel M. Veith, Thomas A. Zawodzinski, Matthew M. Mench, *Journal of Power Sources*, *294*(1), pg 333-338 (2015).

55. “Structure of Spontaneously Formed Solid-Electrolyte Interphase on Lithated Graphite Determined Using Small-Angle Neutron Scattering” Robert L Sacci, Jose Leobardo Bañuelos, Gabriel M. Veith, Kenneth C Littrell, Yongqiang Cheng, Christoph U Wildgruber, Lacy L Jones, Anibal J. Ramirez-Cuesta, Gernot Rother, Nancy J Dudney, *Journal of Physical Chemistry C*, 119 (18), pp 9816–9823 (2015).

54. “Superior Conductive Solid-like Electrolytes: Nanoconfining Liquids within the Hollow Structures” Jinshui Zhang, Ying Bai, Xiao-Guang Sun, Yunchao Li, Bingkun Guo, Jihua Chen, Gabriel M. Veith, Dale K. Hensley, Mariappan Parans Paranthaman, John B. Goodenough, Sheng Dai, *Nano Letters,* 15(5), pg 3398-3402(2015).

53. “Type I Clathrates as Novel Silicon Anodes: An Electrochemical and Structural Investigation” Ying Li, Rahul Raghavan, Nicholas A. Wagner, Stephen Davidowski, Loïc Baggetto, Ran Zhao, Qian Cheng, Jeffery L. Yarger, Gabriel M. Veith, Carol Ellis-Terrell, Michael A. Miller, Kwai S. Chan, and Candace K. Chan, *Advance Science* , 1500057, (2015).

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