

Gordon Henry Waller, Ph.D.

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Professional Experience

U.S. Naval Research Laboratory (NRL) – Washington, DC

Materials Engineer, Alternative Energy Section, October 2022 – present

Naval Surface Warfare Center Carderock Division (NSWCCD) – W. Bethesda, MD

Materials Engineer, Advanced Power and Energy Branch, April 2016 – October 2022

Education

Naval Postgraduate School

Defense Energy Certificate

March 2018 – March 2019

Georgia Institute of Technology

Ph.D. Materials Science and Engineering with concentration in electrochemistry

August 2011 – February 2016

Thesis title: “Investigation into the Electrochemical Behavior and Interfacial Stability of LiMn_2O_4 Electrodes Deposited on Carbon Fibers for Electrical Energy Storage”.

Virginia Polytechnic Institute and State University

M.S. Materials Science and Engineering

May 2010 - May 2011

Thesis title: “Template Directed Growth of Nb doped SrTiO_3 using Pulsed Laser Deposition”.

B.S. Materials Science and Engineering

August 2006 – May 2010

Government Technical Reports

1. **Gordon Henry Waller**, “Evaluation of High-rate Pulsed vs Continuous Charging in Lithium-ion Batteries,” *NSWCCD-63-TR-2021/13* (2021)
2. **Gordon Henry Waller**, Jonathan Ko, Thomas Hays, Daphne Fuentesvilla, “Emerging Energy Storage Technologies,” *NSWCCD-63-TR-2020/11* (2020)
3. **Gordon Henry Waller**, Jonathan Ko, Thomas Hays, Thomas Jiang, “Evaluation of Cell-to-Cell Propagation in Lithium-ion Batteries Containing 18650 Sized Cells,” *NSWCCD-63-TR-2018/43* (2018)
4. **Gordon Henry Waller**, Jonathan Ko, Thomas Jiang, “Evaluation of the Cadenza 83 Ah Lithium-ion Module,” *NSWCCD-63-TR-2018/26* (2018)
5. **Gordon Henry Waller**, Michael Wartelsky, Clinton Winchester, “Evaluation of SAFECAP 18650 Lithium Ion Batteries: Internal Short Circuit Device and Saltwater Immersion,” *NSWCCD-63-TR-2018/11* (2018)
6. **Gordon Henry Waller**, Kane Ivory, Tom Jiang, Louis Levine, Jessica Schwartz, Julie Simmons, “Thermal Abuse of Large Format Lithium-ion Cells Using Radiant Heating,” *NSWCCD-63-TR-2017/62* (2017)
7. **Gordon Henry Waller**, Thomas Jiang, Rebecca Smith, “Radiant Thermal Ramp Testing of Saft VL30 Lithium-ion Cells,” *NSWCCD-63-TR-2017/15* (2017)

Research Journal Publications

1. Miaomiao Ma, Azzam Mansour, Jonathan Ko, **Gordon Henry Waller**, Christopher Hendricks, "Characterization of Li Diffusion and Solid Electrolyte Interface for $\text{Li}_4\text{Ti}_5\text{O}_{12}$ Electrode Cycled with an Organosilicon Additive Electrolyte," **Journal of the Electrochemical Society**, 167, 110549 (2020)
2. Chris Hendricks, Azzam Mansour, Daphne Fuentevilla, **Gordon Henry Waller**, Jonathan Ko, Michael Pecht, "Copper Dissolution in Overdischarged Lithium-ion Cells: X-ray Photoelectron Spectroscopy and X-ray Absorption Fine Structure Analysis," **Journal of the Electrochemical Society**, 167, 090501 (2020)
3. **Gordon Henry Waller**, Curtis Martin, Nicholas Jones, Danielle Paynter, "Treatment of Oil-in-Saltwater Emulsions by Electrochemical Production of Magnetic FeOx Nanoparticles," **Journal of Water Process Engineering**, 31, 100851 (2019)
4. Dongchang Chen, Mahmoud Mahmoud, Jeng-Han Wang, **Gordon Henry Waller**, Bote Zhao, Chong Qu, Mostafa El-Sayed, Meilin Liu, "Operando investigation into dynamic evolution of cathode-electrolyte interfaces in a Li-ion battery," **Nano Letters**, 19, 3 (2019)
5. **Gordon Henry Waller**, Azzam Mansour, "Surface Chemistry Evolution in High-Power Lithium-ion Cathodes," **Proceedings of the 48th Power Sources Conference**, 23.5 (2018)
6. David Bock, **Gordon Henry Waller**, Azzam Mansour, Amy Marschilok, Kenneth Takeuchi, Eesther Takeuchi "Investigation of Solid Electrolyte Interphase Layer Formation and Electrochemical Reversibility of Magnetite, Fe_3O_4 , Electrodes: A Combined X-ray Absorption Spectroscopy and X-ray Photoelectron Spectroscopy Study", **Journal of Physical Chemistry**, 122, 26 (2018)
7. Bote Zhao, Dongchang Chen, Xunhui Xiong, Bo Son, Renzong Hu, Qiaobao Zhang, Ben Rainwater, **Gordon Henry Waller**, Dongxing Zhen, Yong Ding, Yu Chen, C.P. Wong, Meilin Liu, "A high-energy, long cycle-life hybrid supercapacitor based on graphene composite electrodes," **Energy Storage Materials**, 7, pp.32-39 (2017)
8. Ben H. Rainwater, Nenad Velisavljevic, Changyong Park, Haibin Sun, **Gordon Henry Waller**, Georgiy M. Tsoi, Yogesh K. Vohra, Meilin Liu, "High pressure structural study of Samarium doped CeO_2 oxygen vacancy conductor - Insight into the dopant concentration relationship to the strain effect in thin film ionic conductors," **Solid State Ionics**, 292, pp. 59-65 (2016)
9. **Gordon Henry Waller**, Phil D. Brooke, Ben H. Rainwater, Samson Y. Lai, Renzong Hu, Yong Ding, Faisal M. Alamgir, Ken H. Sandhage, Meilin Liu, "Structure and Surface Chemistry of Al_2O_3 Coated LiMn_2O_4 Nanostructured Electrodes with Improved Lifetime," **Journal of Power Sources**, 306, pp. 162-170 (2016)
10. Renzong Hu, Dongchang Chen, **Gordon Henry Waller**, Yunpeng Ouyang, Yu Chen, Bote Zhao, Ben Rainwater, Chenhao Yang, Min Zhu, Meilin Liu, "Dramatically enhanced reversibility of Li_2O in SnO_2 -based electrodes: the effect of nanostructure on high initial reversible capacity," **Energy and Environmental Science**, 9, pp.595-603 (2016)
11. Renzong Hu, **Gordon Henry Waller**, Yukun Wang, Yu Chen, Chenghao Yang, Weijia Zhou, Min Zhu, Meilin Liu, " $\text{Cu}_6\text{Sn}_5@/\text{SnO}_2\text{-C}$ nanocomposite with stable core/shell core/shell structure as a high reversible anode for Li-ion batteries," **Nano Energy**, 18, pp. 234-244 (2015)
12. Dongchang Chen, Dong Ding, Xiayi Li, **Gordon Henry Waller**, Xunhui Xiong, Mostafa A. El-Sayed, Meilin Liu, "Probing the Charge Storage Mechanism of a Pseudocapacitive MnO_2 Electrode Using in Operando Raman Spectroscopy," **Chemistry of Materials**, 27, pp. 6608-6619 (2015)
13. Xunhui Xiong, **Gordon Henry Waller**, Dong Ding, Dongchang Chen, Ben Rainwater, Bote Zhao, Zhixing Wang, Meilin Liu, "Controlled synthesis of NiCo_2S_4 nanostructured arrays on carbon fiber paper for high-performance pseudocapacitors," **Nano Energy**, 16, pp.71-80 (2015)
14. Xunhui Xiong, Dong Ding, Dongchang Chen, **Gordon Henry Waller**, Yunfei Bu, Zhixing Wang, Meilin Liu, "Three-dimensional ultrathin $\text{Ni}(\text{OH})_2$ nanosheets grown on Nickel Foam for High-Performance Supercapacitors," **Nano Energy**, 11, pp. 154-161 (2015)
15. Liang Huang, **Gordon Henry Waller**, Yong Ding, Dongchang Chen, Dong Ding, Zhong Lin Wang, Meilin Liu, "Controllable interior structure of ZnCo_2O_4 microspheres for high-performance lithium-ion batteries", **Nano Energy**, 11, pp. 64-70 (2015)

16. **Gordon Henry Waller**, Samson Y. Lai, Ben H. Rainwater, Meilin Liu, “Hydrothermal Synthesis of LiMn_2O_4 onto Carbon Fiber Paper Current Collector for Binder Free Lithium-ion Battery Positive Electrodes”, *Journal of Power Sources*, pp. 411-416 (2014)
17. Ziyin Lin, **Gordon Henry Waller**, Yan Liu, Meilin Liu, Ching-Ping Wong, “Simple preparation of nanoporous few-layer nitrogen-doped graphene for use as an efficient electrocatalyst for oxygen reduction and oxygen evolution reactions”, *Carbon*, pp. 130-136 (2013)
18. Ziyin Lin, **Gordon Henry Waller**, Yan Liu, Meilin Liu, Ching-Ping Wong, “3D Nitrogen-doped graphene prepared by pyrolysis of graphene oxide with polypyrrole for electrocatalysis of oxygen reduction reaction”, *Nano Energy*, **2**, pp. 241- 248 (2013)
19. Ziyin Lin, **Gordon Henry Waller**, Yan Liu, Meilin Liu, Ching-Ping Wong, “Facile Synthesis of Nitrogen-Doped Graphene via Pyrolysis of Graphene Oxide and Urea, and its Electrocatalytic Activity toward the Oxygen-Reduction Reaction”, *Advanced Energy Materials*, **2**, pp. 884-888 (2012)
20. **Gordon Henry Waller**, Aaron Stein and Jeremiah Abiade, “Nanofabrication of Doped, Complex Oxides”, *Journal of Vacuum Science and Technology B*, **30**, 011804 (2012)
21. **Gordon Henry Waller** and Xiwen Du, “From nanoparticle chains to nanorods: control of ZnO nanostructures by laser ablation”, *Semiconductor Science Technology*, **26**, 075001 (2011)

Professional Society Presentations

1. **Gordon Henry Waller**, Rachel Carter, Corey Love, “Utility of Deactivation By Saltwater Immersion for End-of-Life Processing of Lithium-Ion Cells,” 242nd Electrochemical Society Meeting, 2022, Atlanta, GA
2. **Gordon Henry Waller**, Rachel Carter, Corey Love, “Isothermal Calorimetry as a Valuable Tool for Developing Smart & Safe Charging Protocols,” Materials Research Society Spring Meeting, 2022, Honolulu, HI
3. Richard Johnson, **Gordon Henry Waller**, Siva Nadimpalli, “X-Ray Photoelectron Study of the Binder/Electrode Interface on Silicon Anodes for Lithium Ion Batteries,” 236th Electrochemical Society Meeting, 2019, Atlanta, GA
4. **Gordon Henry Waller**, Azzam Mansour, “Rate and Voltage Dependence of the Electrode-Electrolyte Interface in Ni Containing Lithium-Ion Cathode Materials,” 236th Electrochemical Society Meeting, 2019, Atlanta, GA
5. **Gordon Henry Waller**, Jonathan Ko, Azzam Mansour, “Evaluation of High-Rate Pulsed vs. Continuous Charging in Lithium-ion Batteries,” Intelligent Ships Symposium XIII, 2019, Philadelphia, PA
6. **Gordon Henry Waller**, Azzam Mansour, “Surface Chemistry Evolution in High-Power Lithium-ion Cathodes,” 48th Power Sources Conference, 2018, Denver, CO
7. Thomas Jiang, Jonathan Ko, **Gordon Henry Waller**, “Modified COTS Options for Non-propagating LIB,” IAPG Chemical Working Group Meeting, 2018, NASA Jet Propulsion Laboratory, Oak Grove, CA
8. **Gordon Henry Waller**, Azzam Mansour, “Surface Chemistry Evolution in Blended Lithium-ion Battery Cathode Materials”, 232nd ECS Meeting, Battery Characterization Symposium, 2017, National Harbor, MD
9. **Gordon Henry Waller**, Kane Ivory, Tom Jiang, Louis Levine, Jessica Schwartz, Julie Simmons, Chris Mealy, Josh Lamb, “Radiant Thermal Ramp of Large Format Lithium-ion Cells”, IAPG Chemical Working Group Meeting, 2017, Atlantic City, NJ
10. **Gordon Henry Waller**, Meilin Liu, “Low Cost and Sustainable Electrochemical Devices Using Biomass Derived Carbon Fiber Networks”, MSE Graduate Poster Competition, 2015, Atlanta, GA
11. **Gordon Henry Waller**, Dongchang Chen, Xiaxi Li, Meilin Liu, “Characterization of Surface-Modified LiMn_2O_4 Electrodes Using Surface-Enhanced Raman Spectroscopy”, 225th ECS Meeting, Material and Electrode Designs for Energy Storage and Conversion Poster Session, 2014, Orlando, FL
12. **Gordon Henry Waller**, Philip D. Brooke, Benjamin. H. Rainwater, Kenneth H. Sandhage, Meilin Liu, “Passivated LiMn_2O_4 Coated Carbon Fiber Electrodes for Lithium Ion Batteries”, MSE Graduate Poster Competition, 2014, Atlanta, GA

13. **Gordon Henry Waller**, Meilin Liu, “Carbon Fiber Supported Scalable Nanostructured Electrodes for Lithium Batteries”, First International Forum on Environment and Energy Science 2012, New Concept in Secondary Batteries Symposium, Waikoloa, HI
14. **Gordon Henry Waller**, Dongchang Chen, Jung-Pil Lee, Meilin Liu, “3-D Nano-porous Electrodes for Li Batteries and Supercapacitors”, Electrochemical Society Georgia Chapter Poster Session 2012, Georgia Tech, Atlanta, GA
15. **Gordon Henry Waller**, Jeremiah Abiade, “Growth and Characterization of Epitaxial Oxide Thin Films”, Materials Science and Technology Conference 2009, Journal of Undergraduate Research Symposium, Pittsburgh, PA