Kevin Hays

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EDUCATION

The George Washington University, Washington, DC May 2016
Ph.D. in Chemistry
Dissertation: The Introduction of Li-Alloying Nanoparticles into Carbon Composites for Li-Ion Batteries

Honors and Awards:

- Winner of The George Washington University Technology Commercialization Office Innovation Competition, 2015
- Achievement Rewards for College Scientists (ARCS) fellowship awardee for the Metropolitan Washington Chapter, 2014
- GW Research Fellowship, 2010-2016

Salisbury University, Salisbury, MD May 2009
B.S. in Chemistry (ACS Certified), Minor in Physics
Cumulative GPA: 3.2

Honors and Awards:

- Junior chemistry award, 2007
- Dean's list 4.0 GPA, 2008

Research and Professional Experience:

Post-doc Novel Lithium-Ion Electrode Architecture Development (Oak Ridge National Lab) 2016 - present
• Major contributor to DOE "Silicon Deep Dive" studying the science of processing conditions on Si/graphite composite electrodes for high energy density Li-ion batteries.
• Investigation of water and NMP based slurry on continued oxidation of Si nanoparticles and secondary gas production (J. Phys. Chem C., 2018)
• Analysis of large scale roll-to-roll preparation techniques for Si/graphite composite anodes
• Electrochemical study on the role of secondary drying for polyacrylic acid based binders in Si/graphite composite anodes in full cell configurations (J. Power Sources, 2018)
• Characterization of electrode architecture in Si/graphite composite electrodes as a function of binder

Graduate Research Assistant (GWU) 2010 – 2016
• Produced the first long term reversible arsenic anode for Li-ion battery and optimized cycle life through reduction of nano arsenic on multiwall carbon nanotubes (J.Electrochem. Soc. 2017)
• Synthesized Si nanoparticles by MgSi reduction for low cost Si production (J. Electrochem. Soc. 2017)
• Synthesized tin nanoparticles encapsulated by custom nano-graphtic carbon composite for Li-ion anodes (provisional patent)
• Encapsulate atomic sulfur in graphitic carbon nanospheres for Li-sulfur cathodes (J. Electrochem. Soc. 2013)

Professional Activities

• Member of The Electrochemical Society

Battery Fabrication: Arbin, Biologic, and Maccor electrochemical testing, Coin Cell and Pouch Cell Fabrication
Instrumentation Techniques: JEOL TEMs, FEI TEMs, Zeis SEMs, FEI SEMs, Powder X-ray Diffraction, Electrochemical Impedance Spectroscopy, X-ray Fluorescence, X-ray Photoelectric spectroscopy, Thermogravametric Analysis, Fourier-Transform Inferred Spectroscopy, Raman Spectroscopy, BET Surface Area Analysis, PALS zeta potential and particle sizing,
Lab equipment: Gloveboxes, Vacuum Lines, Class 4 Lasers, Planetary Ball Mills, High Temp. Furnaces, Microwaves
Software: Igor Pro, LabVIEW, MDI Jade, Crystal Diffract, Microsoft Office Suite

List Selected Peer Reviewed Publications

Hays, K. A.; Key, B.; Li, J.; Wood, D. L.; Veith, G. M., Si Oxidation and H2 Gassing During Aqueous Slurry Preparation for Li-Ion Battery Anodes. (J. Phys. Chem. C.) 2018

Hays, K. A.; Ruther, R. E.; Kukay, A. J.; Cao, P.; Saito, T.; Wood, D. L.; Li, J., What Makes Lithium Substituted Polyacrylic Acid a Better Binder Than Polyacrylic Acid for Silicon Graphite Composite Anodes? *(*J. Power Sources) 2018

Li, J., Du, Z. Ruther, R.E., An, S.J., David, L.A., Hays, K.A., Wood, M., Phillip, N.D., Sheng, Y., Mao, C., Kalnaus, S., Daniel, C. Wood, D.L. "Towards Low-Cost, High Energy Density and High Power Density Lithium-Ion Batteries" (J.O.M.) 2017

Hays, K.A., Banek, N., Wagner, M.J. "A Long Term Reversible Arsenic Composite Anode for Li-Ion Batteries" (J. Electrochem. Soc.) 2017

Banek, N., Hays, K.A., Wagner, M. J. "High Capacity Silicon/Multiwall Graphene Nanoshell Li-ion Battery Anodes from a Low-Temperature, High-Yield and Scalable Green Synthesis" (J. Electrochem. Soc.) 2017

Zheng, J., P. Yan, Gu, M., Wagner, M.J., Hays, K.A, et al. "Interfacial Reaction Dependent Performance of Hollow Carbon NanoSphere @ Sulfur composite as a cathode for Li-S battery." Frontiers in Energy Research (2015)

Zheng, J., Wagner, M.J., Hays, K.A, et al. "Revisiting Carbon/Sulfur Composite for Li-S Batteries (J. Electrochem. Soc.) 2013

Patents

Wagner, M.; Banek, N.; Hays, K., "Hollow Carbon Nanosphere Composite Based Secondary Cell Electrodes." US Patent 20160351894 : 2016.

Invention Disclosures

Hays, K.A., Armstrong, B., Veith, G.M., Role of Milling Solvent in Low Cost, Large Scale Si Nanoparticle Production for Li Ion Battery Anodes, ORNL internal, 2018

Hays, K.A., Veith, G.M. Physical Vapor Deposition of Si on Graphite for Li Ion Battery Anodes, ORNL internal, 2018

Graduate and Postdoctoral Advisors: Gabriel Veith (ORNL), Jianlin Li (ORNL), Michael J. Wagner (GWU)