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PROFESSIONAL SUMMARY

Electric vehicle CTO and battery research & technology consultant with over a decade of experience in the development and testing of electrochemical energy storage systems. Trained as a helicopter mechanic in the Marine Corps, I am very comfortable working with my hands and using just about any tool you can think of. A high level of proficiency with all things mechanical, including the design, repair, and operation of most common laboratory instruments as well as pretty much any equipment needed to carry a battery technology from bench-top testing to production. Extremely experienced with handling the logistics of day-to-day laboratory operations, with a particular interest in establishing and maintaining procedures, personnel management, and safety protocols.

EQUIPMENT DESIGN AND MAINTENANCE

Built and validated controllable pneumatic Society of Automotive Engineers (SAE) standard nail penetration tester for cell testing

Designed and built a high-temperature cycling set-up to greatly improve the quality and accuracy of our elevated temperature R&D-scale (<100mAh) testing

Retrofitted a Maccor battery cyler to allow for active temperature monitoring of cells on test

Acquired, set-up, and qualified various pieces of commercial cell fabrication equipment including an electrode press for prismatic cells, cup-forming machine for pouch cells, ultra-sonic welders, semi-automatic winder for cylindrical and wound flat wrap cells, 18650 crimper and grooving machines, and an electrode calender and slitter

Designed and built a non-combustible, vented large cell testing racks to safely test (520) mid-capacity cells (250mAh - 6.5Ah), (104) large-capacity cells (6.5Ah - 17.5Ah), and (58) battery packs (<300Wh) simultaneously

Designed and built a non-combustible, vented, controlled-temperature cycling chamber to test up to (216) mid-capacity, commercial-grade electrochemical cells within the range of 2°C to 90°C to within a precision of ± 0.5 °C

Designed, built, and validated several ambient and controlled-temperature cycling chambers capable of containing cell-level and pack-level Rapid Self-Disassembly (RSD) events in excess of 68Wh and 290Wh, respectively

Designed and built testing setup to safely perform in-house destructive analysis on mid to large capacity cells and battery packs

Designed and built various non-battery-specific pieces of testing equipment over the years that I will only briefly mention here:

- Thermal evaporator for vapor deposition in UHV conditions
- Pneumatic solenoid switch board for valve controls on the vacuum system
- Motor control unit for a scanning tunneling microscope sample stage guide
- Vacuum-suitcase for transporting air-sensitive samples under vacuum from an inert atmosphere glovebox to an x-ray photoelectron spectroscopy system for analysis

Maintained UH-1N and AH-1W helicopters to include day-to-day scheduled maintenance, on-site unscheduled repairs, as well as in-flight troubleshooting and adjustments

Inspected and signed aircraft off as “safe for flight”

Developed a high level of proficiency with the use of various tools and mechanical equipment as needed to perform maintenance on aircraft

ELECTROCHEMICAL TESTING

Established and oversaw cell testing program that produced over (105,000) research cells over the course of (8) years

High level of proficiency with test-writing, maintenance, and operation of all common battery cyler brands (Maccor, Arbin, Neware)

Created and maintained incoming cell screening program to validate third-party cells and cell components

Fabricated the company’s first prototype 500mAh magnesium-metal stacked prismatic cell

Planned and oversaw initial commercial cathode coating runs using Pellion’s proprietary cathode material

Successfully led and oversaw Pellion’s first third-party UN 38.3 validation testing as the on-site expert of our technology

Developed and optimized aqueous slurry cast process for high-loading electrode fabrication

Established in-house shear-mixing electrode preparation technique for slurry cast electrodes

Synthesized novel cathode materials utilizing techniques such as high-energy ball milling, hydrothermal synthesis, solid-state synthesis, carbothermal reduction, xerogel formation, co-precipitation, salt baths, and sealed quartz/glass tube reactions

Further developed proficiency in various characterization techniques such as x-ray diffraction, scanning electron microscopy, galvanostatic cycling, cyclic voltammetry, differential scanning calorimetry, thermogravimetric analysis, energy dispersive spectroscopy, and others

Developed and optimized novel synthesis procedures in order to increase the performance of lithium-metal and magnesium-metal battery cathode materials

Increased efficiency by developing and implementing less energy/time consumptive synthesis methods for several cathode materials, both commonly known and novel

Set up systematic design-of-experiments using MiniTab statistical analysis software

Created and wrote standard operating procedures for Maccor and Arbin galvanostatic cycling, pouch-cell assembly, glovebox operations and coin cell assembly

Worked with in-situ high-energy x-ray diffraction while cycling lithium-ion battery pouch cells at the National Synchrotron Light Source at Brookhaven National Labs

Collaborated continuously with computational modeling researchers in order to target promising chemistries and structures of novel lithium-ion battery cathodes

Developed and wrote undergraduate thesis entitled, "Characterization of mechanism(s) responsible for the lithium-ion conductivity of the glass-ceramic electrolyte prepared from the $\text{Li}_2\text{S-P}_2\text{S}_5$ system"

Performed in-situ x-ray absorption and x-ray photoelectron spectroscopy on a cycling solid-state lithium-ion cell over the course of six visits to the National Synchrotron Light Source located at Brookhaven National Labs

Established skills with SolidWorks, AutoCAD, MATLAB, ZView, ZPlot, LabView and True BASIC

OPERATIONS MANAGEMENT

Instituted and oversaw weekly baseline validation program for various magnesium-ion, magnesium-metal, and lithium-metal systems that generated over (250) weeks of data

Established and maintained database of all of Pellion's Standard Operating Procedures (SOPs), reviewed all changes to current SOPs, and edited and reviewed all new SOP submissions

Led internal safety audit of our standard procedures and processes to ensure compliance with health and safety regulations

Collaborated with software engineer to design digital notebook capabilities that greatly organized and streamlined our electrochemical testing

Led weekly task review meeting to ensure proper tracking of company goals and objectives

Led bi-weekly operations meeting with the CEO, Head of Manufacturing, CTO, Chief Scientist, and the Safety Officer

Established and maintained preventative maintenance and calibration program for all laboratory equipment

Coordinated and planned lab move from Cambridge to Woburn including all facilities, equipment, rigging, and transportation needs

Coordinated all laboratory purchases during the first eight months of the company's operation to include ordering consumables as well as negotiating equipment purchases needed to establish and maintain a wet chemistry laboratory

Continually developed methods and techniques for improving the efficiency and accuracy of the company's testing and analysis procedures

Managed a fleet of (80) commercial vehicles and buses, (38) military vehicles and (33) utility vehicles to include coordinating scheduled and unscheduled maintenance, collecting and reviewing status reports and ensuring adherence to leases and contractual stipulations

Coordinated motor vehicle transport and material handling equipment through various support agencies to move supplies, resources and personnel inside and out of the United States and Central and East Asia

Inspected and supervised repairs and maintenance to equipment, vehicles, and facilities to enforce standards of safety, efficiency, cleanliness and utility

Conferred and cooperated with supervisors and other management personnel in formulating and implementing administrative, operational, and quality assurance policies and procedures

LEADERSHIP

Directly Managed and trained a team of (7) engineers, (3) technicians, (3) full-time COOP students, and (2) part-time employees

Responsible for the hiring, training, and oversight of (4) interns (3) full-time co-op students and (2) full-time engineers in general lab procedures, cell fabrication, as well as basic electrochemical theory

Trained co-workers on mechanical and flight crew procedures and theories of operation

Supervised and continually administered on-the-job training to (5) logistics clerks to maintain a reliable and streamlined work center

Hosts a weekly science discussion group to promote scientific literacy as well as a monthly group on behalf of meetup.com where I help members discover new ways to improve their Meetups

WORK EXPERIENCE

Battery Research and Technology Consultant

Daniel Consulting Group, LLC

2/2019-present

Co-Founder and Chief Technology Officer

SomEV, Inc.

10/2018-present

Head of Lab Operations

Pellion Technologies Inc.

1/2013-2/2019

Lab Manager/Materials Engineer

Pellion Technologies Inc.

10/2010-6/2012

Visiting Researcher

CEDER group, MIT

5/2010 – 10/2010

Research Assistant/Intern

*Dahn group, DPAS, Dalhousie University
Sadoway Lab, DMSE, MIT
First Lab, Physics Dept, Georgia Tech
Alamgir Lab, MSE Dept, Georgia Tech*

*6/2012 – 12/2012
5/2009 - 8/2009
1/2009 - 5/2010
1/2008 - 5/2010*

Custom Furniture Designer/Builder

Blue Moon Woodworks

05/2006 - 08/2007

Helicopter Mechanic/Door-Gunner

U.S. Marine Corps

07/2001 - 05/2006

Logistics Supervisor

U.S. Marine Corps

10/2003 - 05/2006

TRAINING

Scanning Electron Microscopy

Microelectronics Research Center, Atlanta, GA

X-Ray Diffraction

Institute of Paper Science and Technology, Atlanta, GA

Radiation Safety

Brookhaven National Lab, Upton, NY

H-1 Helicopter Maintenance Course

HMT-303, Camp Pendleton, CA

H-1 Helicopter Weapons, Tactics, and Navigation

HMT-303, Camp Pendleton, CA

Introductory Welding Course

Stonybrook Fine Arts, Jamaica Plain, MA

EDUCATION

B.S. Physics w/ minor Materials Science and Engineering, Georgia Tech, 5/2010

23 credit hours of graduate business/management courses, Cambridge College,
12/2011

PUBLICATIONS

C. F. Petersburg, R.C. Daniel, *et al.*, "Soft X-ray characterization technique for Li batteries under operating conditions," *Journal of Synchrotron Radiation*, vol. 16, pp. 610- 615, Sep 2009.

Q. Hu, R.C. Daniel, *et al.*, " Graft copolymer-based lithium-ion battery for high-temperature operation," *Journal of Power Sources*, vol. 196, pp. 5604- 5610, Mar 2011.

CERTIFICATIONS

Certification in Nanomaterials, MSE Dept, Georgia Tech, 5/2009

INTERESTS, HOBBIES, AND FUN FACTS

I've developed a recent obsession with rebuilding and upgrading older electric vehicles (EV). My first project was a 2010 electric moped that I upgraded to Li-ion. Then I purchased a 1980 Comuta-Car, converted it to Li-ion, and completely overhauled and modernized the control electronics (IG: @ev.bertha). Now it's my regular commuter back-and-forth from Somerville to Woburn everyday. Currently I'm in the process of converting my 2nd C-Car (*and this one's going to have solar panels on the roof!*)

Founder and curator for the weekly science advocacy/literacy group, *Church of the Cosmos* (<https://www.meetup.com/Church-of-the-Cosmos/>)

I'm currently the Boston City Organizer for Meetup.com, which mainly entails hosting a monthly meeting where I help other organizers learn how to improve their own meetups

Level 2 Sommelier certification from the Wine and Spirits Education Trust (WSET)

Member of the Boston Sommelier Society

Mentored Science Olympiad team at a Cambridge Rindge and Latin School (We placed 11th in the state in our first competition!)

I play guitar and ukulele, but mostly *Mountain Goats* and *Iron & Wine* covers

Currently working on my first novel, which I hope to finish (1) year ago

FACT: I am two degrees of separation from Chuck Norris.