

## Research and Development Scientist

**PROFILE** | Shrewd researcher, scientist, and engineer with a doctoral degree and strong background in **Applied Physics and Materials Science** and over 13 years of experience in applied physics and electronic materials research and development, spanning academia and industry. **Innovative out of the box thinker** with proven results of **research and development**, and problem-solving by non-conventional means. Innovative research **awarded best fundamental and new concepts for future technology by IEEE PVSC** for solar heterojunction photovoltaic cell. **Intel rotational engineering leadership fellow** experienced in leading a cross-organization collaborative team to bring a **product from development to high volume manufacturing**. Successfully executing plans of action based on data-driven analytics for quality and process control. Exposed and worked with a wide variety of business groups including marketing, technical sales, and customer service.

### AREAS OF EXPERTISE

- Expertise in a broad range of areas including circuits, metallurgy, coatings and lubrication, composite materials, semiconductors (physics, devices, fabrication), computational/analytical modeling of data, and PC IT administration.
- Development & fabrication of biomaterials, MEMS, as well as medical, optoelectronic, and semiconductor devices.
- Mechanics, Thermodynamics, Corrosion, Electronic, and Quantum mechanical properties of materials including materials characterization, materials interaction (tribology, corrosion, etc)
- Renewable energy including photovoltaics and battery research as well as renewable public policy.
- Nanofabrication/microfabrication (Vacuum Science, Thin-Films, VLSI, MEMs, Microfluidics, Process Development).
- Complex Analysis, ODE's and other mathematical tools for the physical sciences.

### EXPERIENCE

#### CEO/EXECUTIVE CONSULTANT, BREAKTHROUGH MATERIALS AND TECHNOLOGY - 01/2013-CURRENT

- Forming startup conducting research and attempting the commercialization of Si-anode Li-Ion battery tech.
- Providing technical expertise as a consultant and researcher for two solar energy startups in the Los Angeles area.
- R&D of optical fiber connectors and components materials. Solved materials related inline production issues increasing yields of qualified parts by 100%. Created new inhouse wear/corrosion resistant coating.
- Leading research and development efforts of ultra-thin silicon solar cells based on IP technology developed by company Rayton Solar. Reworked their solar cell fabrication process to involve 30% fewer steps while increasing yield of acceptable cells by 50%. Additionally introduced and started development of new product line for the company using GaAs.
- Advised founder of CPV startup RadicalSun on various technical and scientific technologies. Authored technical literature for use in a business plan to be distributed to investors.

#### ROTATIONS IN RESEARCH AND ENGINEERING, INTEL CORPORATION - 06/2013-05/2016

##### RESEARCH SCIENTIST, INTEL LABS

- Conducted user experience research on auto interfaces and alert/notification experience for autonomous driving vehicles. Successfully ran DOE in conjunction with Stanford University collecting data from over 15 participants.
- Developed system architecture for sensor data acquisition and subsequent processing in the user experience research lab. Decreased complexity of the system as well as system and operational costs to 25% of original cost by consolidation, and architecture optimization. Mined sensor data used for self-learning system improvement.
- Optimized backend processing of data stream including automating 95% of the task thus increasing data processing speed by over 800%.
- Adapted commercial simulation software used for CPU temperature hotspot simulation to simulate the performance of thermoelectric devices both as Peltier coolers and energy harvesters.
- Created adaptation of hotspot simulation software and used for developing thermoelectric hotspot cooling architectures and developing a cost-benefit analysis of such systems.
- Developed thermoelectric device design to be prototyped and tested on top of Intel CPU die.

##### PROCESS TECHNOLOGY DEVELOPMENT ENGINEER, TECHNOLOGY AND MANUFACTURING GROUP

- Responsible for installation, operation, and maintenance of ASM Eagle 12 PECVD tool. Executed sustaining activities such as keeping up to date with a regular maintenance schedule, troubleshooting equipment issues, and maximizing tool availability for manufacturing and development on Intel's 14nm & 10nm node.
- Oversaw the successful installation of several new tools 20% ahead of schedule.
- Developed process change which will save several million dollars during 14nm technology node.
- Achieved sustaining excellence by keeping tools online 85% of the time.
- Utilized process control systems to review and reduce process variation.
- Led efforts to troubleshoot & solve in-line production issues to increase process quality and yield by over 20%.
- Implemented process changes to solve integrated problems in the production line.

**GRADUATE RESEARCHER, CALIFORNIA INSTITUTE OF TECHNOLOGY - 08/2006-12/2012**

Research on earth-abundant materials and epitaxial thin film heterostructures for use in a variety of devices including photodetectors and low-cost photovoltaic devices. Thin film growth was conducted via Molecular Beam Epitaxy, RF sputtering, thermal oxidation, and evaporation. Device design, simulation, optimization, fabrication, and testing were conducted to simulate a variety of uses and conditions. Optoelectronic properties of the heterostructures were engineered in order to tune the bandgap. Efforts resulted in world open circuit voltage record for approximately 2 months and advanced understanding of growth methods from simulation results. Enhanced absorption of light from ultra-thin layers using plasmonic wave guides. Design of a prototype industrial deposition system for fabrication of cells. Structural and electronic characterizations of the solar cells conducted using XRD, SEM, EDS, PL, Suns Voc, Hall mobility, RHEED, and TEM.

**RESEARCH & DEVELOPMENT/MARKETING INTERN, NITINOL DEVICES & COMPONENTS/CORDIS; J&J - 06/2005-09/2005**

Characterization of Nitinol stents. Characterization methods included corrosion, and mechanical tests, SEM, radiopacity, etc. Data obtained from these tests were used to better improve quality control well as compiled into a document describing advantages of Cordis stents vs. the competition. A final report was drafted and distributed amongst sales representatives to highlight advantages of the product they were selling. This material was part of several changes made that increased sales by 35% year over year.

**EDUCATION | CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA, CA**

PH.D. – APPLIED PHYSICS AND MATERIALS SCIENCE– DECEMBER 2012 - GPA3.75

**CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA, CA**

M.SC. – APPLIED PHYSICS – DECEMBER 2007 – GPA3.75

**UNIVERSITY OF CALIFORNIA, BERKELEY, BERKELEY, CA**

B.S. - MATERIALS SCIENCE AND ENGINEERING & ELECTRICAL ENGINEERING - JUNE 2006 – GPA: 3.60 MAJOR GPA: 3.75

**SELECT PATENTS, PUBLICATIONS, AND TALKS**

- Systemic Optimization of On-chip Thermoelectric Cooling, IEEE CPMT 2015, Kyoto, Japan November 9, 2015
- Patent: Microelectronic Structures Including Cuprous Oxide Semiconductors and Having Improved P-N Heterojunctions. PCT/US2011/053814, 61/388,047 (US), WO2012/04472.
- Band Transport Model for ZnO/Cu2O Solar Cells- Journal of Photovoltaics, Specials review Oct 2012.
- Epitaxial Growth of Cu2O and ZnO/Cu2O Thin Films on MgO by Plasma-Assisted Molecular Beam Epitaxy – Journal of Crystal Growth, Volume 319, Issue 1, 15 March 2011, Pages 39-43.
- Simulations of Copper Oxide/ ZnO Heterostructures - Spring 2010 MRS poster.
- Epitaxial Cu2O Heterostructures - IEEE 34th PVSC Conference talk and poster. (Won Student Award) (2009).
- Modeling, Synthesis, and Characterization of Thin Film Copper Oxide for Solar Cells – IEEE PVSC Conference manuscript PVSC.2009.5411394.

**ADDITIONAL SKILLS & ABILITIES**

- IT Skills: Linux, Windows, OSX, Virtualization (vSphere, Hyper-V, Citrix), MSFT Domain Admin, MDM, HPC
- Programing Languages: HTML, HTML5, JavaScript, C++, Matlab, oNScript, R, E-prime
- Programs: Word, Excel, Access, PowerPoint, Matlab, Mathematica, LabView, AutoCAD, Solidworks.

**LEADERSHIP**

- Graduate Student Council (08/2006-08/2009)
  - Social Committee - Organized all nightlife activities for graduate student body, including club nights, social hours, and night time sports games.
- Delta Chi Fraternity (01/03- 05/06)
  - Philanthropy Chair- Raised money for the Red Cross and set up a blood drive on campus. Organized Halloween event for underprivileged youths.
  - Fundraising Committee- Helped raise over \$10,000 for the fraternity activities. - Liaison to fundraising companies. - Led 45+ members in fundraising projects that included textbook sales, working sales stands at Oakland Raider games, and alumni golf tournaments.
  - Recruitment Chair - Responsible for the recruitment and retention of new members with an overall members hip increase of 20%. - Instructed other members on recruiting strategies.
- Jun Chung Tae Kwon Do- Tae Kwon Do (1996-2008)
  - Trained with team for national competition.
  - Actively recruited new members for national competition team.
  - 2nd-degree black belt and instructor of intermediate and advanced classes for people of all ages.