

Isaac Sprague
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August 8th, 2011

Dear Hiring Manager,

I am applying for the Post-Doctoral position that you have listed on your website.

I have recently completed my PhD in Mechanical Engineering from Washington State University in July of this year. Although my graduate studies have been sharply focused on studying principal phenomena in fuel cells my career aspirations are much broader. My true passion is in math and its application to help understand, predict, and solve real world problems. As I've begun my search for where to continue my career with a focus on applied math I found your website and found the lab description fascinating and exciting and I would be very interested in working there.

I believe that the Swanson lab would be an excellent fit for me and I would love to learn more about it. The use of mathematics to study tumor progression and diagnosis is a very appealing concept to me. Though I do not have direct experience working with tumors I do have experience working on biological based systems and projects from my time at Micronics Inc. where I was a part of developing point-of-care molecular diagnostics. I worked closely with the life science team to develop and integrate biological assays into microfluidic structures. This required me to develop an understanding of the biology in order for me to effectively collaborate with my colleagues and develop biology driven devices. Working with and learning from my life scientist counterparts was something I thoroughly enjoyed. I am a very quick learner with a strong mathematical aptitude and am confident that if given the opportunity I would be a valuable addition to your team.

Thank you for taking the time to review my resume which is attached. As I'm sure you are aware, resumes can only provide a quick cross section of someone's experiences. The intangibles of personality are difficult, if not impossible to put forward in a document. I look forward to having the opportunity to meet with you and your team to explore the potential of our working together.

Sincerely,

Isaac Sprague

ISAAC SPRAGUE, PhD

206-949-7910

August 2011

IsaacSprague@gmail.com

OBJECTIVE: To obtain a challenging mechanical engineering position where I can apply my strong mathematical, simulation, and theoretical analysis skills to work on the cutting edge of technology. I am a strong self starter who is anxious to contribute in a team environment. My PhD research has been focused on microfluidics, but my career interests are much broader.

SKILLS

- Mathematical Analysis: numerical and analytical analysis from governing equations and first principals, uncertainty analysis, finite element analysis
- Mathematical Analysis tools: Mathematica, Matlab, Excel
- Fluid Dynamics: CFD, Conjugate heat transfer/CFD analysis, ability to develop custom simulations
- Numerical Simulation/CFD tools: ANSYS/CFX, Abaqus, Comsol, Nisa, HyperMesh
- Programming Languages: C, Fortran, C#, Visual Basic, LabVIEW, linux
- Design Engineering tools: SolidWorks, AutoCAD, Catia, Pro/Engineer
- Test Engineering: electrochemical impedance spectroscopy, LabVIEW data acquisition, basic lab techniques

EXPERIENCE

Microsoft Corp., Redmond (April 2010 – September 2010)

Reliability Contractor, Xbox reliability:

- Conjugate heat transfer/CFD analysis on console active cooling subsystem
- Thermal stress analysis to predict reliability of CPU/GPU ball grid array
- Managed and tracked accelerated console lifecycle testing
- Console packaging drop-testing

Micronics Inc., Redmond (June 2008 – April 2010)

R&D Engineer:

- Microfluidic circuit design and testing for FDA regulated point of care medical device
- Development of optical detection subsystems on multiple projects including data analysis and algorithm design and implementation.
- Advancement of disposable microfluidic laminate assembly processes
- Disposable-to-instrument interface design and specification
- Development of software in C# for instrument-fluidic control and assay detection
- Full system uncertainty analysis on disposable-instrument assay design
- Statistical analysis of pre clinical-trial manufacturing lot validation
- Worked collaboratively with cross discipline team members including biologists and chemists

Boeing Aircraft Company, Everett (May 2006 – Aug 2006)

Internship:

- Moveable trailing edge interfaces modeling and specification for the 787
- Stress analysis on joint bolts
- Creation of model based definition files and drawing installation files
- Maintain and update part database

Aerojet, Redmond (May 2005 – Aug 2005)

Internship:

- FEA of rocket engine modules, structural assemblies, welded joints
- Mesh generation and model preprocessing, running solutions, and post processing for results presentation
- Correlated numerical results with experimental data
- FEA data file format conversion using Fortran
- Authored a fuel tank analysis report for customer
- Compiled and managed material property database

EDUCATION

PhD M.E. - Washington State University, July 2011

Graduate G.P.A. 4.0

Dissertation: *Mathematical Studies of the Electric Double Layer in Electrochemical Cells with an Emphasis on Laminar Flow Fuel Cells*

- Development of custom numerical simulation for electrochemical electrode kinetics using finite volume method
- Validation of numerical results to published analytical solutions and where possible Comsol generated results
- Development multidimensional analytical approximate solutions for fundamental electrochemical physics

MS M.E. - Washington State University, May 2008

Graduate G.P.A. 4.0

Thesis: *Characterization of a Microfluidic Based Direct-Methanol Fuel Cell*

- Fabrication of micro-fuel cells using a variety of techniques
- Empirical characterization laminar flow fuel cell performance
- Electrochemical impedance spectroscopy to characterize in situ fuel cell performance
- Development of equivalent circuit models of electrode kinetics and correlated with empirical results

BS M.E. - Washington State University, Dec 2006

Mathematics Minor, Cumulative G.P.A. 3.93

Senior Design Project: *Design of elastic boot contamination guard for food processing equipment*

- Lead group of 6 ME/MSE students working on industry funded project
- Development elastic boot designs/concepts and modeled in Catia
- Non-linear FEM to analyze a large displacement hyper elastic silicone boot design

PUBLISHED PAPERS

Isaac B. Sprague, and Prashanta Dutta, *Depth Averaged Analytical Solution for a Laminar Flow Fuel Cell with Electric Double Layer Effects*, SIAM J. Appl. Math., Submitted 2011.

Isaac B. Sprague and Prashanta Dutta, *The Electrode-Electrolyte Interface in Acidic/ Alkaline Microfluidic Fuel Cells*, IMECE2011, accepted but not finalized.

Isaac B. Sprague, and Prashanta Dutta, *Role of the Diffuse Layer in Acidic and Alkaline Fuel Cells*, Electrochimica Acta **56**, (2011): 4518-4525

Isaac B. Sprague and Prashanta Dutta, *Modeling of Diffuse Charge Effects in a Microfluidic Based Laminar Flow Fuel Cell*, Numer. Heat Tr. A-Appl. **59**, (2010): 1-27

Isaac B. Sprague, Doyoung Byun, and Prashanta Dutta, *Effects of Reactant Crossover and Electrode Dimensions on the Performance of a Microfluidic Based Laminar Flow Fuel Cell*, Electrochimica Acta **55**, (2010): 8579-8589

Isaac B Sprague, Prashanta Dutta, and Su Ha, *Flow Rate Effect on Methanol Electro-oxidation in a Microfluidic Laminar Flow System*, J. New Mat. Electrochem. Sys. **13**, (2010): 305-313

Isaac B. Sprague and Prashanta Dutta, *A Numerical Model to Simulate Diffuse Effects in Microfluidic Fuel Cells*, IMECE2010-38735

Isaac B Sprague, Prashanta Dutta, and Su Ha, *Characterization of a Membraneless Direct-Methanol Micro Fuel Cell*, P. I. Mech. Eng. A-J. Pow. **223**, (2009): 799-808

Isaac B. Sprague, Prashanta Dutta, and Su Ha, *Characterization of a Microfluidic Based Direct-Methanol Fuel Cell*, IMECE2008-67439

REFERENCES

Reference	Relationship	Years Known
Prashanta Dutta, PhD Associate Professor Mechanical & Materials Eng Washington State University Pullman, WA 99164-2920 Tel: (509) 335-7989 Email: prashanta@wsu.edu Web: www.mstf.wsu.edu	Graduate Advisor Dr. Prashanta Dutta was my graduate advisor for both my Master's and Ph.D. Dr. Dutta can speak about my strong analytical and mathematical aptitude as well as my ability and desire to learn about new topics. He can confirm that I would be a valuable addition to any scientific team pursuing understanding through mathematical analysis.	5+
Joan Haab, PhD Director, Product Transfer Cepheid Inc. 904 Caribbean Drive Sunnyvale, CA 94089 Ph: 408-400-4395 Cell: 408-203-5973	Project Manager / Head of Life Sciences Dr. Joan Habb was the head of the life science department and project management when I worked at Micronics. She oversaw the projects that I was involved with during my tenure there and I worked closely with her to achieve successful integration of biological assays and microfluidic structures. She can attest to my ability to work alongside biologists and quickly learn about the biology which allows me to have intelligent and productive conversations and meaningful input into biology driven projects.	3
Troy Daiber Engineering Manager Micronics, Inc. 8463 - 154th Ave NE Redmond, WA 98052 Phone: 425-895-9197 ext 143 Email: tdaiber@micronics.net	Engineering Manager Mr. Troy Daiber was my direct supervisor at Micronics. He can confirm my ability to work productively and efficiently as well as communicate ideas clearly and thoroughly for various audiences. Troy often relied on my ability to communicate with the life scientists to interpret the biological needs of a project into engineering specifications.	3
