

# BRENTAN ALEXANDER

- > Scientist
- > Entrepreneur
- > Engineer



## ABOUT ME

I have devoted my career to solving complex problems in the fields of electrochemistry, fluid flow, heat and mass transport, combustion, and thermodynamics. My expertise includes fuel cells, flow batteries, battery technologies, the design and fabrication of microfluidic and MEMS systems, numerical analysis of complex systems and devices using FEA based approaches, analytical and numerical (CFD) analysis of fluid dynamic and thermodynamic systems, and reactive chemistry.

I specialize in the design, proactive analysis, technical review, and testing of complex electrochemical and electromechanical systems, as well as failure analysis and root cause identification.

## RECENT EXPERIENCE

### CHIEF SCIENCE OFFICER

### NEW ENERGY RISK

January 2015 – Current

I lead the technical due diligence process of potential insurance opportunities in the clean energy arena by investigating the technical risks of client processes and technologies.

### FOUNDER / CHIEF EXECUTIVE OFFICER

### SWIFT CALCS

March 2015 – Current

Swift Calcs simplifies and accelerates engineering design and analysis. I built Swift Calcs to be an intuitive alternative to paper, spreadsheets, and cumbersome software packages.

### SENIOR MECHANICAL ENGINEER

### WRIGHTSPEED

March 2014 – January 2015

I lead the design of our thermal management system. My updates achieved equal system performance with significant drop in pump and compressor load. Through testing, I have identified and solved operational anomalies of our motors/inverters to improve reliability.

### FOUNDER / DIRECTOR

### ENERGYFOLKS

2011 – Current

Director, board member, and founder. I built and maintain web-tools helping thousands of students and young professionals in energy connect, communicate, and find jobs.

### ASSOCIATE

### EXPONENT

June 2013 – March 2014

I worked with major clients to test, analyze, and evaluate thermal systems, consumer appliances, and utility-scale energy systems. Explained technical concepts to clients.

## EDUCATION

### Ph.D., MECHANICAL ENGINEERING

### STANFORD UNIVERSITY

2009 – 2012

Performed fundamental research supported by an NDSEG fellowship on the efficient and clean conversion of carbonaceous fuels to electricity and/or hydrogen using electrochemical conversion techniques in a solid oxide fuel cell device. I utilized the results of my experiments to develop a coupled physical model of the electrochemical, thermodynamic, and fluid dynamic processes occurring in the fuel cell device.

### M.S., MECHANICAL ENGINEERING

### MASSACHUSETTS INSTITUTE OF TECHNOLOGY

2007 – 2008

Conducted research on the design, fabrication, and testing of a microfluidic device designed to effectively separate liquid and gas phases during boiling.

### B.S., MECHANICAL ENGINEERING

### MASSACHUSETTS INSTITUTE OF TECHNOLOGY

2003 – 2007

4.9/5.0 GPA, 5.0/5.0 within major. Outstanding research and thesis award.

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## SELECTED PUBLICATIONS

B.R. Alexander, R.E. Mitchell, T.M. Gür, **Modeling of Experimental Results for Carbon Utilization in a Carbon Fuel Cell**, Journal of Power Sources, 228 (2013) pp. 123-140

B.R. Alexander, R.E. Mitchell, T.M. Gür, **Oxy-Combustion of Solid Fuels in a Carbon Fuel Cell**, Proceedings of the Combustion Institute 34 (2013), pp. 3445-3452

B.R. Alexander, R.E. Mitchell, T.M. Gür, **Viability of Coupled Steam-Carbon-Air Fuel Cell Concept for Spontaneous Co-production of Hydrogen and Electrical Power**, Journal of the Electrochemical Society, 159 B810 (2012)

B.R. Alexander, R.E. Mitchell, T.M. Gür, **Experimental and Modeling Study of Biomass Conversion in a Solid Carbon Fuel Cell**, Journal of the Electrochemical Society, 159 B347 (2012)

B.R. Alexander, R.E. Mitchell, T.M. Gür, **A New Steam-Carbon Fuel Cell Concept for Cogeneration of Hydrogen and Electrical Power**, Journal of the Electrochemical Society, 158(5) (2011) B505

Brentan R. Alexander and Evelyn N. Wang, **Design of a Microbreather for Two-Phase Microchannel Heat Sinks**, Nanoscale and Microscale Thermophysical Engineering, Volume 13, Issue 3 July 2009 , pages 151 – 164

## HONORS AND MEMBERSHIPS

- NDSEG Fellow, U.S. Department of Defense, 2009-2012
- Rohsenow Heat and Mass Transfer Fellow, MIT, 2007-2008
- Padmakar P. Lele Student Award for Outstanding Research and Thesis, MIT, 2007
- Phi Beta Kappa Society, Tau Beta Pi, Pi Tau Sigma, Electrochemical Society

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