

# Devin Burns

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## Summary of Qualifications

- Research interest – development and mechanical characterization of materials for energy and power applications to improve system performance and longevity
- Developed aluminization and sputtering techniques for producing Ni-based superalloy microcomponents
- Four years experience developing custom microtensile systems and conducting microtensile tests
- Materials characterization experience including SEM, XRD, TEM and WDS
- Strong communication skills including experience collaborating with individuals from different disciplines and nationalities

## Education

Johns Hopkins University, Baltimore, MD  
*Doctorate of Philosophy, Mechanical Engineering*  
*Master of Science, Mechanical Engineering*

August 2012  
December 2009

Univ. of Maryland, Baltimore County (UMBC), Baltimore, MD  
*Bachelor of Science, Mechanical Engineering*

May 2008

## Research Experience

***Graduate Research Assistant***, Johns Hopkins University 2008-Present

- Produced freestanding superalloy foils and microcomponents and characterized their room temperature and elevated temperature mechanical properties using custom microtensile systems
- Used x-ray diffraction, transmission electron microscopy, scanning electron microscopy, differential scanning calorimetry and wave dispersive spectroscopy to characterize as deposited and heat treated materials
- Sputtered thick Haynes 718 superalloy foils which exhibit excellent high temperature strengths and uncovered unique precipitation mechanisms in these nanocrystalline films
- Aluminized and homogenized LIGA Ni microcomponents to produce freestanding superalloys with yield and ultimate strengths 3 to 4 times LIGA Ni microcomponents
- Developed a high temperature microtensile system using a novel displacement based force sensor for load measurement
- Assisted collaborators at the Karlsruhe Institute of Technology in Germany with the electro co-deposition, heat treatment, and characterization of LIGA Ni-Al microcomponents

***Consultant***, Nuvotronics 2011-Present

- Conducted room temperature microtensile tests on material provided to verify yield stress and Young's modulus data
- Advised Nuvotronics employees on the construction of their own microtensile system

***Undergraduate Research Assistant***, UMBC 2006-2008

- Designed novel sandwich panel core geometries using rapid prototype techniques
- Characterized mechanical properties of cores demonstrating that improved strength to weight ratios can be achieved over traditional core geometries

***Undergraduate Summer Intern***, Massachusetts Institute of Technology Summer 2006

- Mechanically alloyed binary Ni-W, Fe-W and Ni-Fe systems in an attempt to produce bulk ultra-high strength materials capable of dramatically cutting weight in mechanical systems

## **Leadership Positions**

***Student Mentor***, Department of Mechanical Engineering, Baltimore, MD 2009-2011

- Designed research projects involving 3D surface reconstruction and mechanical testing for two high school and one undergraduate student and advised them as they conducted their research

***President***, Tau Beta Pi Engineering Honor Society, MD Delta Chapter 2007-2008

- Organized chapter meetings and events including UMBC's Engineering Week and the chapter's induction process and ceremony
- Increased membership over 30%

## **Publications**

- Burns D., Zhang Y., Weihs T., Hemker K. *Development of Ni-based Superalloy Microcomponents using Vapor Phase Aluminumization*. Scripta Materialia, In progress
- Burns D., Zhang Y., Teutsch M., Bade K., Aktaa J., Hemker K. *Sputtered Ni-Base Superalloys for Microscale Devices*. Superalloys 2012 Conference Proceedings, In progress
- Markkula S., Storck S., Burns D., Zupan M. *Compressive Behavior of Pyramidal, Tetrahedral, and Strut-Reinforced Tetrahedral ABS and Electroplated Cellular Solids*, Advanced Engineering Materials, 2009

## **Presentations**

- Burns D., Zhang Y., Teutsch M., Perez-Berquist S., Bade K., Pollock T., Aktaa J., Hemker K. *Development and Characterization of Ni-Al Superalloys for High Temperature LIGA MEMS Materials*, Material Research Society Oral Presentation, 2011
- Burns D., Zhang Y., Teutsch M., Bade K., Aktaa J., Hemker K. *Development of Ni-Al Superalloys for High Temperature LIGA MEMS Materials*, Material Research Society Poster, 2011
- Burns D., Teutsch M., Perez-Berquist S., Bade K., Pollock T., Aktaa J., Hemker K. *Development of Ni-Al Superalloys for High Temperature LIGA MEMS Materials*, Gordon Conference on Thin Films and Small Scale Mechanical Behavior Poster, 2010
- Burns D., Hemker K. *Developing MEMS Superalloys*, Gordon Conference on Physical Metallurgy Poster, 2009