

**Owen T. Kingstedt**  
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## EDUCATION

### University of Illinois at Urbana-Champaign (UIUC)

Ph. D. – Aerospace Engineering August 2014

*Dissertation title:* “Effect of micro- and nano-structure on the deformation response of a Ag<sub>60</sub>Cu<sub>40</sub> eutectic alloy”

*Dissertation advisor:* Professor John Lambros

M.S. – Aerospace Engineering April 2011

*Thesis title:* “A pulsed laser loading technique for controlled dynamic loading of nanostructured materials”

*Thesis advisor:* Professor John Lambros

### Michigan Technological University

B. S. – Mechanical Engineering December 2008

Minors: Structural Materials and Mathematical Sciences

## RESEARCH INTERESTS

Mechanics of materials for extreme environments, Multi-length and time scale experimentation, High strain-rate mechanics, Additive manufacturing processing-structure-property relationships, Interfacial effects on macroscopic properties, Thermo-mechanical effects and adiabatic shear banding, Failure of MEMs and multilayer thin films

## RESEARCH EXPERIENCE

**Postdoctoral Scholar**, California Institute of Technology October 2014 – July 2016

*Thermo-mechanical response of Mg and Mg alloys (AZ31B) under high strain-rate loading*

Collaborative investigation of the conversion of plastic work to heat for individual deformation mechanisms under dynamic combined shear-compression loading through experiments and simulation

*Strain localization in Mg and AZ31B alloy*

Study of strain localization near individual defects and the communication between defects focusing on the susceptibility of failure via adiabatic shear banding over a range of grain sizes

*Strain-rate sensitivity of AZ31B alloy*

Examination of the dynamic strain-rate sensitivity of severe-plastic deformation processed materials with respect to dominant deformation mechanisms

*Rate sensitivity of twin variant formation in single crystal Mg*

Exploration of the formation and propagation of deformation twins under quasi-static and dynamic loading conditions.

**Graduate Research Assistant, UIUC**

Jan. 2009-Aug 2014

*Constitutive response of a hierarchical nanostructured silver-copper eutectic*

Utilized a Split-Hopkinson pressure bar to load nanostructured silver-copper cast eutectic specimens to incrementally increasing levels of strain in a high strain-rate regime  
Examined the material deformation response on the meso- and micro-scale using SEM

*Ultra high speed imaging*

Developed an experimental technique to capture real-time images of spallation of thin films and substrates over the nanosecond time scale  
Captured the deformation of ordered copper-silver eutectic material due to split-Hopkinson pressure bar loading

*Pulsed laser loading technique*

Developed a highly controllable laser loading technique of thin films, increasing the repeatability of ultra-high strain rate loading  
Performed failure experiments on single and multilayer thin films with coherent interface structures  
Collaborated with Los Alamos National Lab (LANL) in the design and fabrication of laser loading specimens

**TEACHING EXPERIENCE**

**Course Instructor**, Department of Aerospace Engineering, UIUC

Spring 2013

**AE 323: Applied Aerospace Structures** - 79 students

Course focuses:

1. Fundamental concepts of stress, strain, equilibrium, compatibility, material constitution and properties
2. Analysis of beams and shafts of monocoque and semi-monocoque construction
3. Energy methods of beams and shafts

Delivered three 50 minute lectures and held 5 office hours each week

Developed and administered two 50 minute mid-term exams, and one 3 hour final examination

Formulated homework sets and accompanying solutions

Managed course website on Blackboard Compass 2g

Oversaw the work of a graduate teaching assistant

**Teaching Assistant**, Department of Mechanical Science and Engineering, UIUC

Fall 2011

**ME 487: MEMS-NEMS Theory & Fabrication** - 8 students

Course focuses:

1. Cleanroom fabrication theory, general cleanroom safety
2. Physical and chemical theory, design, and hands-on fabrication of micro- and nano-electromechanical systems (MEMS and NEMS)
3. Fabrication processes: lithography, additive and subtractive processes, bulk and surface micromachining, deep reactive ion etching (DRIE)

Led two 4 hour lab sections held in a class 100 cleanroom, held 2 office hours each week

Guided graduate students in the fabrication of two MEMs devices

- Microfluidic logic chips (AND, NAND, NOT, NOR)
- Thin-membrane silicon-nitride pressure sensor

**Laboratory Assistant**, Department of Aerospace Engineering, UIUC

Spring 2010

**AE 560: Fracture Mechanics Laboratory** – 16 students

Directed four graduate student groups through four laboratory experiments

1. Thermo-elastic stress analysis of crack tip stress fields
2. Measurement of stress intensity factors using DIC
3. J-integral measurement of single edge notched specimens
4. Measurement of dynamic initiation Fracture toughness for PMMA under mixed mode conditions

## HONORS and AWARDS

Faculty Outstanding Graduate Student Award, UIUC

2014

Annual award recognizing an individual graduate student that has provided outstanding research and teaching contributions to the mission of the Aerospace Engineering Department

Teaching Fellowship - Aerospace Engineering, UIUC

Spring 2013

Competitive fellowship for PhD students interested in pursuing an academic career.

Responsibilities include preparing and delivering lectures, developing homework and exams

List of teachers ranked as excellent, UIUC

Fall 2011, Spring 2013

ASME Materials Division Travel Award, IMECE Denver CO

November 2011

## PROFESSIONAL MEMBERSHIPS

American Society of Mechanical Engineers (ASME)

Society of Experimental Mechanics (SEM)

American Institute of Aeronautics and Astronautics (AIAA)

## PROFESSIONAL SERVICE

Session Organizer, XIII SEM International Congress, Orlando, FL

June 2015

## COMMUNITY OUTREACH

**Instructor**, Illinois Aerospace Institute (IAI)

Summers 2012-2014

IAI is a weeklong camp for promising high school students to learn about concepts of aerospace engineering through lectures, activities and design projects

## PUBLICATION LIST

### Journal publications:

1. O.T. Kingstedt, B. Eftink, J. Lambros, and I. M. Robertson, Quasi-static and dynamic compressive deformation of a bulk nanolayered Ag–Cu eutectic alloy: Macroscopic response and dominant deformation mechanisms, *Materials Science and Engineering: A*, 595, 54-63 (2014)

2. B. Eftink, N. A. Mara, O. T. Kingstedt, D.J. Safarik, J. Lambros, and I. M. Robertson, Anomalous deformation twinning in coarse-grained Cu in Ag<sub>60</sub>Cu<sub>40</sub> composites under high strain-rate compressive loading, *Materials Science and Engineering: A*, **618**, 254-261 (2014)
3. O. T. Kingstedt and J. Lambros, Ultra-high Speed Imaging of Laser-Induced Spallation, *Experimental Mechanics* **55** 587-598 (2015)
4. O. T. Kingstedt, B. Eftink, I. M. Robertson, and J. Lambros, Anisotropic dynamic compression response of a directionally-cast silver-copper eutectic alloy (*under review: Acta Materialia*)
5. O. T. Kingstedt and M. Bischann, Role of texture on the strain-rate sensitivity of Mg and Mg alloy AZ31B (*submitted: Journal of Dynamic Behavior of Materials*)
6. O. T. Kingstedt, J. Lloyd, and G. Ravichandran, On the conversion of plastic work to heat for deformation slip and twinning in AZ31B, (*in preparation for submission to Mechanics of Materials in 2015*)
7. B. P. Eftink, N.A. Mara, O. T. Kingstedt, J. Lambros and I. M. Robertson, Deformation response of a cube-on-cube and incoherent twin interfaces in AgCu eutectic after dynamic loading (*in preparation for submission to Acta Materialia in 2015*)
8. O. T. Kingstedt, B. Eftink, I. M. Robertson, and J. Lambros, Inelastic strain recovery of an ultra-fine structured unidirectional Ag-Cu eutectic material (*in preparation for submission to Advanced Materials in 2015*)
9. K. Hazeli, O. T. Kingstedt, V. Kannan, D. Sun, G. Ravichandran, K. Bhattacharya, and K. T. Ramesh, On the effect of strain-rate on strain evolution and twinning modes in Magnesium single crystal (*in preparation*)
10. D. Ghosh, O.T. Kingstedt and G. Ravichandran, Thermo-mechanical response of Mg and AZ31B (*in preparation*)
11. O. T. Kingstedt and G. Ravichandran, Strain localization and failure of magnesium under shear-compression loading, (*in preparation*)

**Conference proceedings:**

1. O. T. Kingstedt, B. Eftink, I. M. Robertson and J. Lambros, Compressive deformation response of a nanostructured Cu-Ag eutectic material, Society of Experimental Mechanics Lombard, IL. June 2013.

**PRESENTATIONS and POSTER SESSIONS**

1. O. T. Kingstedt, B. P. Eftink, I. M. Robertson, and J. Lambros, Deformation response of a directional solidified Ag-Cu eutectic composite, SEM 2015 Annual Conference & Exposition on Experimental and Applied Mechanics, Costa Mesa, CA June 2015
2. O. T. Kingstedt and G. Ravichandran, Thermo-mechanical and shear localization behavior of magnesium alloys, MACH conference 2015, Annapolis, MD, April 2015

3. O. T. Kingstedt, D. Ghosh, and G. Ravichandran, High-rate thermomechanical response of magnesium alloys, Materials for Extreme Dynamic Environments (MEDE) 2014 Meeting, Baltimore, MD Oct. 2014
4. O. T. Kingstedt, B. Eftink, I. M. Robertson, and J. Lambros, Quasi-static and dynamic compressive deformation response of a Cu-Ag hierarchical nanolayered material, ASME 2013 International Mechanical Engineering Congress & Exposition, San Diego, CA Nov 2013
5. O. T. Kingstedt, B. Eftink, I. M. Robertson, and J. Lambros, Compressive deformation response of a nanostructured Cu-Ag eutectic material, SEM 2013 Annual Conference & Exposition on Experimental and Applied Mechanics, Lombard, IL June 2013
6. O. T. Kingstedt, B. Eftink, B. Cao, J. Chan, I. M. Robertson, J. Lambros, and P. Sofronis, High strain rate loading response of nano- and microstructured single and multilayered metals, Stewardship Science Academic Alliance Symposium Poster Session, Washington D.C. Feb. 2012
7. O. T. Kingstedt, B. Eftink, B. Cao, J. Chan, M. Dadfarnia, I. M. Robertson, J. Lambros, and P. Sofronis, Dynamic Response of Structured, Single and Multilayered Materials, ASME 2011 International Mechanical Engineering Congress & Exposition, Denver, CO Nov. 2011
8. O. T. Kingstedt, B. Eftink, B. Cao, J. Chan, I. M. Robertson, J. Lambros, and P. Sofronis. Dynamic Response of Nanostructured Single and Multilayer Metals, Stewardship Science Academic Alliance Symposium Poster Session, Washington D.C. Feb. 2011