Lessa Kay Grunenfelder

Department of Chemical Engineering & Materials Science
Viterbi School of Engineering
University of Southern California

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Education

PhD, Materials Science — December, 2012
University of Southern California, Los Angeles, CA
Dissertation: Defect control in vacuum bag only processing of composite prepregs

Diploma in Innovation — December, 2011
University of Southern California, Los Angeles, CA

MS, Materials Science — August, 2009
University of Southern California, Los Angeles, CA

BS, Astronautical Engineering — May, 2007
University of Southern California, Los Angeles, CA

Teaching Experience

Lecturer, University of Southern California — August 2015-Present
Full time teaching faculty

Summer Faculty, Crossroads School for Arts and Sciences — Summer 2015
Elementary school science teacher: Design It! Build It! Test It!

Instructor: USC Mission Science – Norwood Street Elementary School — Sept, 2014-May 2015
Duties: Create and implement lesson plans, lead a weekly project based after-school science program

Part Time Lecturer (USC): MASC 310 "Materials Behavior and Processing" — Fall 2014
Professor for junior level intro to materials course.
Enrollment: 40 undergraduates.

Guest Lecturer (UC, Riverside) — Feb 21, 2013 / Nov 14, 2013
CHE 105 – "Nano-composites"
CEE 135 – "Composites"

Teaching Assistant (USC): MASC 310 "Materials Behavior and Processing" — Fall 2007 / Fall 2008
Mentor: Professor Steve Nutt
Duties: Discussion sections, biweekly office hours, proctoring and grading of exams.

Research Experience

University of Southern California (Jan 2014 – present)
Postdoctoral Scholar
Advisor: Professor Steve Nutt – M.C. Gill Composites Center
Project: Composite processing – material efficiency and sustainable manufacturing.

University of California, Riverside (Jan 2013 - Jan 2014)
Postdoctoral Scholar
Advisor: Professor David Kisailus – Biomimetics and Nanostructured Materials Lab
Project: Investigation of structure-function relationships in biomineralizing organisms, and fabrication of bio-inspired composites.

University of Southern California (Aug 2007- Dec 2012)
Graduate Research Assistant
Advisor: Professor Steve Nutt – M.C. Gill Composites Center
Project: Parametric studies on void formation in carbon fiber epoxy composites produced using low pressure, low cost, out-of-autoclave manufacturing.

Awards and Honors

Viterbi School of Engineering Best Thesis Award in Materials Science	2013
2nd place, Mork Family Department of Chemical Engineering and Materials Science Student Research Symposium (oral presentation)	2012
1st place. Processing category, Society for the Advancement of Material and Process Engineering Technical Conference student poster competition	2012
Achievement Rewards for College Scientists (ARCS) Scholar	2010-2012
American Society for Metals International Student Scholarship	2011
1st place, American Society for Metals International, Los Angeles Chapter, Student Night oral presentation competition	2011
1st place, Society for the Advancement of Material and Process Engineering Graduate/Senior Student Award (oral presentation)	2011
1st place, Outstanding Paper Award, Society for the Advancement of Material and Process Engineering Conference	2011
Best Paper Award, 25th American Society for Composites Technical Conference	2010

Mentoring

USC SURE (Summer Undergraduate Research Experience) 2014
Developing and leading an undergraduate student through a summer research project to encourage her future application to graduate school at USC

Overland Elementary Math & Science Night April 26, 2012
Leading a 1 hour workshop for elementary school students and their parents on science topics ("Earthquake Science" in 2012, "Biomimetic Materials" in 2013 and "Robot Science" in 2014) Oct 17th, 2013 Oct 16th, 2014

UCR-Hispanic Serving Institutions Summer Bridge Program 2013
Supervising two female undergraduate transfer students from under-represented groups in science through a summer research project to encourage them to pursue STEM careers

USC Center for Engineering Diversity Summer Institute 2010, 2011
Introducing a group of incoming USC freshmen to opportunities available in research and designing and leading students through a research project. Mentored one female and one male student in 2010 and two male students in 2011

Graduate and Undergraduate Student Research Mentoring
Mentoring and collaborating with undergraduate and graduate students in the research laboratory. Working closely with students to formulate research questions, design experiments, analyze data, and present results

- Cristina Cabble (USC: BS 2013, now at Jacobs) – size and geometry effects in vacuum bag only processing of composite panels
- Stephanie Klimszack (USC: BS 2013, now at Boing) – processing and characterization of hat-stiffened composite panels
- Michael Asfaw (USC: BS 2011, MS 2013 now at Harman International) – out-time characterization of composite prepregs
- Melanié Perrot (visiting graduate student from Institut Catholique des Arts et Métiers in Touluse, France) – composite prepreg scrap re-use
- Brian Weden (UCR: BS 2012, now at Sorenson Engineering) – structure-function relationships in the radular teeth of the chiton *Cryptochiton stelleri*
- Steven Herrera (UCR: BS 2012, now a Ph.D. student) – structure-function relationships in the stomatopod dactyl club
- Yixiang Zhang and Xiaochen Li (current USC Ph.D. students) – fabrication and characterization of high-temperature composites
- Colten Elkin and Maria Bacci (Current USC undergraduates) – void formation in composites as a function of prepreg architecture
- Filip Miletic (current USC Master's student) – analysis of a novel vinyl hybrid resin system for composite manufacturing

Service and STEM Outreach Activities

Volunteer, PS Science, William Green Elementary School 2015
Assisting an elementary school teacher (3rd grade) in weekly hands on science projects

Networking Chair, USC Postdoctoral Association 2014-2015

Grand Awards Judge, Intel International Science and Engineering Fair May 13-14, 2014
Bioengineering and Materials Science category judge

Volunteer, Pre-MESA Day March 8, 2014
Judging the EggXpress egg drop competition for middle school and high school students, helping to facilitate preliminary student competitions

Judge, California State Science Fair
Display approval committee member and category judge for materials science junior division (2011). Category chair, materials science junior division (2012, 2014). Project of the year judge (2014)

Judge, Los Angeles County Science Fair
Category chair, materials science junior division (2012, 2014, 2015)

"Design by Nature" at the Riverside Municipal Museum May 18, 2013
Facilitating technical presentations to the public by undergraduate researchers and practical demonstrations by local middle school students

Delegate (University of California), Coalition for National Science Funding (CNSF) Day May 7, 2013
Representing the UC system in discussions with senators and congress members in Washington, D.C., presenting research at the CNSF exhibition "Investments in STEM Research and Education: Fueling American Innovation"

Treasurer, Materials Research Society (MRS), USC Chapter 2008-2012

Reviewer, Composites: Part A

Publications

8. E. Escobar de Obaldia, C. Jeong, **L.K. Grunenfelder**, D. Kisailus, P. Zavattieri. Analysis of the mechanical response of biomimetic materials with highly oriented microstructures through 3D printing, mechanical testing and modeling. Journal of the Mechanical Behavior of Biological Materials 2015;48:70-85 DOI
7. T. Centea, **L.K. Grunenfelder**, S.R. Nutt. A review of out-of-autoclave prepregs – Material properties, process phenomena and manufacturing considerations. Composites: Part A 2015;70:132-154 DOI
6. **L.K. Grunenfelder,** E. Escobar de Obaldia, Q. Wang, D. Li, B. Weden, C. Salinas, R. Wuhrer, P. Zavattieri, D. Kisailus. Stress and damage mitigation from oriented nanostructures within the radular teeth of *Cryptochiton stelleri*. Advanced Functional Materials 2014;24(39):6093-6104 DOI *
5. **L.K. Grunenfelder**, S. Hererra, D. Kisailus. Crustacean derived nanostructured biomimetic composites. Small 2014;10(16):3207-3232 DOI
4. **L.K. Grunenfelder**, N. Suksangpanya, C. Salinas, G. Milliron, N. Yaraghi, S. Herrera, K. Evans-Lutterodt, S.R. Nutt, P. Zavattieri, D. Kisailus. Bio-inspired impact resistant composites. Acta Biomaterialia 2014;10(9):3997-4008 DOI
3. **L.K. Grunenfelder**, T. Centea, P. Hubert, S.R. Nutt. Tow impregnation in an out-of-autoclave prepreg as a function of room temperature aging time. Composites: Part A 2013;45:119-126 DOI
2. **L.K. Grunenfelder**, S.R. Nutt. Prepreg age monitoring via differential scanning calorimetry. Journal of Reinforced Plastics and Composites 2012;31(5):295-302 DOI
1. **L.K. Grunenfelder**, S.R. Nutt. Void formation in composite prepregs – effect of dissolved moisture. Composites Science and Technology 2010;70(16):2304-2309 DOI

*Cover article

Conference Proceedings and Book Chapters

8. **L.K. Grunenfelder**, T. Centea, G. Riddle, S.R. Nutt. The influence of prepreg architecture of part quality for vacuum bag only processing. Society for the Advancement of Material and Process Engineering (SAMPE) Technical Conference, 2015.
7. **L.K Grunenfelder**, S.R. Nutt. Moisture and pressure effects on void formation in prepreg processed composites. In: Alfred C. Loos, ed. *Manufacturing of Composites: Volume 6 of the American Society for Composites Series on Advances in Composites Materials*. DEStech publications, Inc. Lancaster, Pennsylvania, 2013.
6. **L.K. Grunenfelder**, C. Fisher, C. Cabble, S. Thomas, S.R. Nutt. Defect control in out-of-autoclave processing of structural elements. Society for the Advancement of Material and Process Engineering (SAMPE) Technical Conference, 2012.
5. **L.K. Grunenfelder**, R. Panikar, S.R. Nutt. TGA-FTIR analysis of out-gassing components for co-cure of sandwich structures. American Society for Composites 27th Technical Conference, 2012.
4. **L.K. Grunenfelder**, S.R. Nutt. Monitoring prepreg out-time with glass transition temperature. American Society for Composites 26th Technical Conference, 2011.
3. **L.K. Grunenfelder**, S.R. Nutt. Air removal in VBO prepreg laminates: Effects of breathe-out distance and direction. Society for the Advancement of Material and Process Engineering (SAMPE) Technical Conference, 2011.
2. **L.K. Grunenfelder**, S.R. Nutt. Out time effects on VBO prepreg and laminate properties. Society for the Advancement of Material and Process Engineering (SAMPE) Conference, 2011.*
1. **L.K. Grunenfelder**, S.R. Nutt. Moisture and pressure effects on void formation in prepreg processed composites. American Society for Composites 25th Technical Conference, 2010.*

* Best paper award winner

Selected Presentations

5. **L.K. Grunenfelder,** G. Milliron, I. Gallana, N. Suksangpanya, S. Herrera, P. Zavattieri, D. Kisailus "Investigation of an impact resistant crustacean. Part 1: Ultrastructure and nanomechanics." Materials Research Society Fall Meeting. Boston, MA. December 5th, 2013.
4. **L.K. Grunenfelder,** D. Kisailus "Recent advances in biological and biomimetic composites." Composites at Lake Louise. Lake Louise, Alberta, Canada. November 7th, 2013.
3. **L.K. Grunenfelder**, C. Salinas, S. Herrera, C. Huang, D Kisailus "Toughening mechanisms of biological and biomimetic composites via interfacial engineering." 87th ACS Colloid & Surface Science Symposium. Riverside, CA. June 25th, 2013.
2. **L.K. Grunenfelder,** S.R. Nutt "Prepreg out-time and age monitoring" Northrop Grumman Lunch and Learn series. Los Angeles, California, USA. October 7th, 2011.
1. **L.K. Grunenfelder** "Science and technology of real-time dielectric cure monitoring" SAMPE Los Angeles Chapter Seminar. Los Angeles, California. February 23rd, 2010.

Workshops

Integrated Computational Materials Education Summer School, Santa Barbara, CA — July 14-18, 2014
NSF sponsored short course deigned to introduce attendees to available tools (Nanohub and Thermocalc) to incorporate computational tools into materials science curriculum. Modules presented included density functional theory, thermodynamics, kinetics and mechanics

NSF Workshop for Developing and Sustaining Productive Graduate Research Groups in Engineering, Arlington, VA — July 11-12, 2011
Workshop for Ph.D. students, postdocs, and early faculty on establishing and effectively managing university research groups

Composites Design Workshop, Stanford Continuing Studies Program — Fall 2009
Online intensive short course on composite design

Professional Societies

- Society for the Advancement of Material and Process Engineering (SAMPE)
- Materials Research Society (MRS)
- American Society for Composites (ASC)