

## **CURRICULUM VITAE: Katherine C. Chen**

Materials Engineering Department  
California Polytechnic State University  
San Luis Obispo, CA 93407  
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### **EDUCATION**

**MICHIGAN STATE UNIVERSITY**, East Lansing, Michigan  
Honors College  
B.A. in Chemistry, 1990  
B.S. in Materials Science and Engineering, 1990  
graduated with highest honor

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY**, Cambridge, Massachusetts  
Department of Defense Graduate Fellowship  
Ph.D. in Material Science (Minor in Math), 1996  
Thesis entitled "Compositional Influences on the Microstructures, Phase Stability, and Mechanical Properties of TiCr<sub>2</sub> Laves Phase Alloys"

### **EXPERIENCE**

<b>CALIFORNIA POLYTECHNIC STATE UNIVERSITY</b> , San Luis Obispo, CA	
<b>Chair</b> , Materials Engineering Department	10/06-present
<b>Professor</b> , Materials Engineering Department	9/07-present
<b>Associate Professor</b> , Materials Engineering Department	9/02-present
<b>Assistant Professor</b> , Materials Engineering Department	9/99-9/02

<b>NORTHWESTERN UNIVERSITY</b> , Evanston, IL	
<b>Visiting Scientist</b> , Materials Science and Engineering Department	8-12/05, 6-9/06

<b>NITINOL DEVICES &amp; COMPONENTS</b> , Fremont, CA	
<b>Consultant</b> , Manufacturing and Processing Group	6/04-8/04

<b>MICHIGAN STATE UNIVERSITY</b> , East Lansing, MI	
<b>Visiting Faculty</b> , Chemical Engineering and Materials Science Department	8/07
<b>Visiting Scientist</b> , Chemical Engineering and Materials Science Department	7-12/01, 6-8/02

<b>LOS ALAMOS NATIONAL LABORATORY</b> , Los Alamos, NM	
<b>Visiting Scientist</b> , Material Science and Technology Division: Metallurgy	Summer, 2000
<b>Staff Member</b> , Material Science and Technology Division: Metallurgy	1/98-8/99
<b>Postdoctoral Research Associate</b> , MST Division: Metallurgy	10/96-1/98
Department of Energy (DOE) Q-clearance	
<b>Volunteer Tutor</b> , Santa Clara Pueblo, Santa Fe Indian School	10/97-6/99

<b>NEW MEXICO TECH</b> , Socorro, NM	
<b>Instructor</b> , Materials Engineering Department	Spring, 99

<b>MASSACHUSETTS INSTITUTE OF TECHNOLOGY</b> , Cambridge, MA	
<b>Postdoctoral Research Associate</b> , Dept. Materials Science and Engineering	6/96-10/96
<b>Research Assistant</b> , Dept. Materials Science and Engineering	9/90-6/96
<b>Teaching Assistant</b> , Dept. Materials Science and Engineering	Spring, 96
<b>Tutor</b> , Office of Minority Education and Dept. of Material Science and Engineering	1/91-6/94

## **RESEARCH INTERESTS**

Processing-Structure-Property Relationships of Materials; Materials Characterization (x-ray diffraction – XRD, scanning electron microscopy – SEM, transmission electron microscopy – TEM, electron microprobe analysis – EMPA, differential scanning calorimetry – DSC, Fourier transform infrared spectroscopy – FTIR), Defect Structures, Microstructural Evolution, Solidification, Phase Transformations, Mechanical Properties, Deformation Mechanisms, Novel Processing Techniques, Alloy Design and Development, Laves phase intermetallics, solders, shape memory alloys

## **RESEARCH PROJECTS**

Characterization and Development Laves Phase Intermetallics, Los Alamos National Laboratory  
Structure-Property Relationships of Shape Memory Alloys, Cal Poly CENG  
Thermo-mechanical fatigue of Solder Materials, Michigan State University, NSF  
Degradation Mechanisms of Plastic Encapsulated Microcircuits, Lockheed Martin  
Development of Rechargeable Gas Mask Filters, Cal Poly subcontract to ONR  
Structure Determination of NiTi-H Alloys, Nitinol Devices and Components  
Development of K-12 Science modules on Nanoscience, NCLT, Northwestern University

## **CONSULTING AND COLLABORATIONS**

Center for Excellence in Science and Math Education (CESaME), Cal Poly  
National Center for Learning and Teaching (NCLT) in Nanoscale Science and Engineering, Northwestern University  
Los Alamos National Laboratory, Materials Science and Technology Division, Metallurgy Group, Alloy Design and Development Team  
Michigan State University, Materials Science Department, Solder Research group  
Sun Microsystems Advanced Technology  
Nitinol Devices & Components  
Lockheed Martin

## **PUBLICATIONS**

L. Vanasupa, K.C. Chen, J. Stolk, R. Savage, T. Harding, B. London, and W. Hughes, “Converting traditional materials labs to project-based learning experiences: Aiding students' development of higher-order cognitive skills,” *MRS Symposium Proceedings*, December 2007, and to be published in *Journal of Materials Education*.

R. Savage, K.C. Chen and L. Vanasupa, “Integrating Project-based Learning throughout the Undergraduate Engineering Curriculum,” *Journal of STEM Education*, Vol 8, Issue 3 & 4, June-December 2007.

K.C. Chen, “Exciting Students about Materials Science & Engineering: a project-based, service-learning museum design course,” *ASEE Annual Conference Proceedings*, June 2007.

K.C. Chen and B. London, “WIP: Crossing the Engineering Border into Art and Society with a Materials Selection for the Life Cycle course,” *Frontiers in Engineering Education*, 2006.

K.C. Chen, L. Vanasupa, B. London, and R. Savage, “Infusing the Materials Engineering Curriculum with Sustainability Principles,” *ASEE Annual Conference Proceedings*, June 2006.

Amanda Runciman, K.C. Chen, A. R. Pelton, and C. Trepanier, “Effects of Hydrogen on the Phases and Transition Temperatures of NiTi,” *Shape Memory and Superelastic Technologies*, May 2006.

L. Vanasupa, L. Slivovsky, and K.C. Chen, “Global challenges as inspiration: A classroom strategy to foster social responsibility,” *Science and Engineering Ethics*, Vol. 12, 373-380, 2006.

L. Vanasupa, K.C. Chen, and F. Splitt, "Classroom Techniques to Promote Engineering Solutions for a Sustainable Future," IUMRS Proceedings and Journal of Materials Education, July 2005.

K.C. Chen, L. Christensen, and A. Runciman, "Passport to the Materials World: Materials Engineering Outreach Activities," ASEE Annual Conference Proceedings, June 2005.

K.C. Chen, B. London, L. Vanasupa, T.T. Orling, and L. Christensen, "Travelogue from the Materials World: A first week laboratory activity," ASEE Annual Conference Proceedings, 2004.

W.C. Crone, E.J. Voss, and K.C. Chen, "Interactive Demonstrations and Laboratories Using Shape Memory Alloys," ASEE Annual Conference Proceedings, 2004.

K.C. Chen, W.C. Crone, and E.J. Voss: "Shape Memory Alloys for Classroom Demonstrations, Laboratories, and Student Projects," *MRS Symposium Proceedings*, April 2004, and *Journal of Materials Education*.

J.G. Lee, K.C. Chen, and K.N. Subramanian, "Formation and Growth of Intermetallics around Metallic Particles in Eutectic Sn-Ag Solder," *Journal of Electronic Materials*, 33, November 2003, 1240-1248.

H. Rhee, F. Guo, J.G. Lee, K.C. Chen, and K.N. Subramanian, "Effects of Intermetallic Morphology at the Metallic Particle/Solder Interface on Mechanical Properties of Sn-Ag-Based Solder Joints," *Journal of Electronic Materials*, 33, November 2003, 1257-1264.

L. Vanasupa and K.C. Chen, "MATERIALS SCIENCE AND ENGINEERING IN THE U.S.: *A review of practices and trends*," *Journal of Materials Education*, October 2003.

A. R. Pelton, C. Trépanier, X-Y Gong, A. Wick, and K.C. Chen, "Structural And Diffusional Effects Of Hydrogen in TiNi," submitted to Proceedings of the Materials & Processes for Medical Devices Conference, ASM International, September 2003.

K.C. Chen and V. Ravi, "Physical Metallurgy – Providing Unifying Principles in Diverse Areas of Materials Engineering," *JOM, TMS*, May 2003.

A. R. Pelton, C. Trépanier, X-Y Gong, A. Wick, and K.C. Chen, "Structural And Diffusional Effects Of Hydrogen in TiNi," to be published in Proceedings of the Conference on Shape Memory and Superelastic Technologies, SMST-2003, May 2003.

K.C. Chen, "Entering the Metals Zone," chapter in the textbook, Navigating the Materials World: A guide to understanding materials behavior, ed., C. Baille and L. Vanasupa, Academic Press, 2003.

K.C. Chen, "How we learned to love the phase diagram with a Ti-Cr alloy characterization lab," ASEE Annual Conference Proceedings, 2003.

K.C. Chen, L. Vanasupa, and T. Orling, "A multi-functional Introductory Materials Science course: emphasizing engineering and achieving accreditation objectives," *MRS Symposium Proceedings*, JJ6.4, December 2002, and *Journal of Materials Education* Vol. 25, No. 1-3, p. 101, 2002.

K.C. Chen, "NiTi – Magic or Phase Transformations?," New Educators Workshop Update 2002: Standard Experiments in Engineering, Materials Science and Technology, 2002.

K.C. Chen, "Metallic Glass: Driving Far from Equilibrium and Returning Back," New Educators Workshop Update 2002: Standard Experiments in Engineering, Materials Science and Technology, 2002.

K.C. Chen, A. Telang, J.G. Lee, and K.N. Subramanian, "Damage Accumulation under Repeated Reverse Stressing of Sn-Ag Solder Joints," *Journal of Electronic Materials*, November 2002.

R.E. Hackenberg, D.C. Swift, J.C. Cooley, K.C. Chen, D.J. Thoma, D.L. Paisley and A. Hauer, "Phase Changes in Ni-Ti under Laser Shock Loading," International Workshop on New Models and Hydrocodes for Shock Wave Processes in Condensed Matter Proceedings, May 2002.

D.J. Thoma, K.C. Chen, M.I. Baskes, and E.J. Peterson, "The Effect of Stoichiometry in C15 HfCo<sub>2</sub>," The Fourth Pacific Rim International Conference on Advanced Material and Processing (PRICM 4) Proceedings, TMS, 2001.

- K.C. Chen, F. Chu, and D.J. Thoma, "HfCo<sub>2</sub> Laves Phases Intermetallics Part II: Elastic and Mechanical Properties as a Function of Composition," *Intermetallics* **9**, 785, 2001.
- K.C. Chen, E.J. Peterson, P.G. Kotula, and D.J. Thoma, "HfCo<sub>2</sub> Laves Phases Intermetallics Part I: Solubility Limits and Defect Mechanisms," *Intermetallics* **9**, 771, 2001.
- D.J. Thoma, K.A. Nibur, K.C. Chen, J.C. Cooley, L.B. Dauelsberg, W.L. Hults, and P.G. Kotula, "The Effect of Alloying on the Properties of (Nb,Ti)Cr<sub>2</sub> C15 Laves Phases," *Materials Science and Engineering A*, Volumes 329-331, June 2002, p. 408-415.
- L. Vanasupa, H. Smith, B. London, K. Chen, D. Niebuhr, L. Griffin, and J. Jones, "The Foundation Series on Corrosion: Integrating Science, Math, Engineering & Technology in a Lab Setting," *ASEE Annual Conference Proceedings*, 2001.
- K.C. Chen and P.T. Adalian Jr., "Incorporating Information Competence into Classes," *Impacting Society through Materials Science and Engineering Education*, *MRS Symposium Proceedings*, GG6.10, 2001, and in *Journal of Material Education*, Vol. 23, No. 1-6, p. 143, 2001.
- L. Vanasupa and K.C. Chen, "Innovations in Materials Science and Engineering Education: From Wulff to Web," *MRS Bulletin* Vol. 25, April 2000.
- K.C. Chen, P.G. Kotula, F. Chu, and D.J. Thoma, "Microstructures and Mechanical Properties of Two-Phase Alloys Based on NbCr<sub>2</sub>," High-Temperature-Ordered Intermetallic Alloys VIII, *MRS Symposium Proceedings*, Vol. 552, p. KK7.5.1, 1998.
- P.G. Kotula, C.B. Carter, K.C. Chen, D.J. Thoma, F. Chu, and T.E. Mitchell, "Defects and Site Occupancies in Nb-Cr-Ti C15 Laves Phase Alloys," *Scripta Materialia* **39**, 619, 1998.
- R.H. Hanrahan Jr., K.C. Chen, and M.P. Brady, "The Effects of Beryllium Additions on the Oxidation of Nickel Aluminide and Titanium Aluminide Based Intermetallics," High Temperature Corrosion and Materials Chemistry, P.Y. Hou, M.J. McNallan, R. Oltra, E.J. Opila, and D.A. Shores (Eds.), *ECS*, pp. 458-465, 1998.
- K.C. Chen, S.M. Allen, and J.D. Livingston, "Factors Affecting the Room-Temperature Mechanical Properties of TiCr<sub>2</sub>-base Laves Phase Alloys," *Materials Science and Engineering A* **242**, 163, 1998.
- K.C. Chen, D.J. Thoma, F. Chu, P.G. Kotula, C.M. Cady, G.T. Gray III, P.S. Dunn, D.R. Korzekwa, W.O. Soboyejo, and C. Mercer, "Processing and Properties of Dual Phase Alloys in the Nb-Cr-Ti System," The Third Pacific Rim International Conference on Advanced Material and Processing (PRICM 3) Proceedings, *TMS*, p. 1431, 1998.
- K.C. Chen, P.G. Kotula, F. Chu, and D.J. Thoma, "Formation of a Metastable BCC Solid Solution and Decomposition to a C15 Laves Phase in Melt-Spun CrNb<sub>10</sub>Ti<sub>10</sub>," Phase Transformations and Systems Driven Far from Equilibrium, *MRS Symposium Proceedings*, Vol. 481, p. 89, 1997.
- D.J. Thoma, F. Chu, P. Peralta, P.G. Kotula, K.C. Chen, and T.E. Mitchell, "Elastic and Mechanical Properties of Nb(Cr,V)<sub>2</sub> C15 Laves Phases," *Materials Science and Engineering A* **239-240**, 251, 1997.
- D.J. Thoma, G.K. Lewis, J.O. Milewski, K.C. Chen, and R.B. Nemec, "Rapid Fabrication of Materials Using Directed Light Fabrication," THERMEC '97, 1997.
- P.G. Kotula, K.C. Chen, D.J. Thoma, F. Chu, and T.E. Mitchell, "Orientation Relationships in the System Nb-NbCr<sub>2</sub>," Proceedings of Microscopy and Microanalysis 1997, *EMSA*, 1997.
- K.C. Chen, S.M. Allen, and J.D. Livingston, "Assessment of the Compositional Influences on the Toughness of TiCr<sub>2</sub>-base Laves Phase Alloys," High-Temperature-Ordered Intermetallic Alloys VII, *MRS Symposium Proceedings*, Vol. 460, p. 695, 1996.
- K.C. Chen, S.M. Allen, and J.D. Livingston, "Microstructures of Two-Phase Ti-Cr Alloys Containing the TiCr<sub>2</sub> Laves Phase Intermetallic," *Journal of Materials Research*, **12**, 1472, 1997.
- K.C. Chen, S.M. Allen, and J.D. Livingston, "Stoichiometry and Alloying Effects on the Phase Stability and Mechanical Properties of TiCr<sub>2</sub>-base Laves Phase Alloys," High-Temperature-Ordered Intermetallic Alloys VI, *MRS Symposium Proceedings*, Vol. 364, p. 1401, 1994.

K.C. Chen, S.M. Allen, and J.D. Livingston, "Morphology, Deformation, and Defect Structures of TiCr<sub>2</sub> in Ti-Cr Alloys," High-Temperature-Ordered Intermetallic Alloys VI, *MRS Symposium Proceedings*, Vol. 288, p. 373, 1992.

## **PRESENTATIONS**

IUMRS - International Conference on Electronic Materials, Sydney, Australia - <i>invited</i>	8/08
Materials Research Society (MRS) Spring Meeting, San Francisco, CA - <i>invited</i>	3/08
Materials Research Society (MRS) Fall Meeting, Boston, MA	12/07
American Society for Engineering Education (ASEE), Honolulu, HI	6/07
Engineering Projects in Community Service (EPICS), San Diego, CA (poster)	5/07
The Minerals, Metals, and Materials Society (TMS) Annual Conference, Orlando - <i>invited</i>	2/07
Frontiers in Education (FIE), San Diego, CA	10/06
American Society for Engineering Education (ASEE), Chicago, IL	6/06
Northwestern University - <i>invited</i>	12/05
MS&T 05, Pittsburg, PA	10/05
International Conference on Materials for Advanced Technologies, Singapore	7/05
American Society for Engineering Education (ASEE), Portland, OR	6/05
The Minerals, Metals, and Materials Society (TMS) Annual Conference, San Francisco, CA	2/05
California Polytechnic State University, Pomona, CA	10/04
American Society for Engineering Education (ASEE), Salt Lake City, UT	6/04
Materials Research Society (MRS) Spring Meeting, San Francisco, CA	4/04
American Society for Engineering Education (ASEE), Nashville, TN	6/03
Materials Research Society (MRS) Fall Meeting, Boston, MA	12/02
National Educators Workshop: Update 2002, San Jose, CA	10/02
American Society for Engineering Education (ASEE), Montreal, Quebec	6/02
The Minerals, Metals, and Materials Society (TMS) Annual Conference, Seattle, WA	2/02
Materials Research Society (MRS) Spring Meeting, San Francisco, CA	4/01
TMS Annual Conference, New Orleans, LA	2/01
Cal Poly Physics Colloquium, San Luis Obispo, CA	11/00
American Society for Engineering Education (ASEE), St. Louis, MO	6/00
TMS Annual Conference, San Diego, CA	3/99
California Polytechnic State University, San Luis Obispo, CA	2/99
Wayne State University, Detroit, MI	1/99
MRS Fall Meeting, Boston, MA	12/98
Third Pacific Rim Int. Conf. Advanced Materials and Processing (PRICM/TMS), Honolulu, HI	7/98
University of California, Los Angeles (UCLA), CA	5/98
Engineering Foundation Conference on Nonstoichiometric Intermetallics, Kona, HI (poster)	4/98
Illinois Institute of Technology, Chicago, IL	3/98
Arizona State University, Tempe, AZ	3/98
Wayne State University, Detroit, MI	2/98
TMS Annual Meeting, San Antonio, TX	2/98
MRS Fall Meeting, Boston, MA (poster)	12/97
Brown University, Providence, RI	5/97
General Motors, Research and Development Technology Center, Detroit, MI	2/97
MRS Fall Meeting, Boston, MA	12/96
Gordon Conference on Physical Metallurgy, Holderness, NH (poster)	7/96
Los Alamos National Laboratory, Los Alamos, NM	5/96
Harvard University, Materials Science Seminar, Cambridge, MA	2/96
Rome Air Force Laboratory, Hanscom AF Base, MA	12/95
MRS Fall Meeting, Boston, MA	12/94
MRS Fall Meeting, Boston, MA (poster)	12/92

### **PROFESSIONAL SOCIETIES and ACTIVITIES**

American Society for Materials (ASM International): Cal Poly Student Chapter Faculty Advisor  
The Minerals, Metals, and Materials Society (TMS): Cal Poly Student Chapter Faculty Advisor  
    Young Leaders Intern 2000  
    Structural Materials Division Representative for Student Affairs  
    Structural Materials Committee  
    Physical Metallurgy Committee: JOM editor  
Materials Research Society (MRS): Academic Affairs Committee, chair of University Chapters  
American Society for Engineering Education (ASEE)  
The American Ceramic Society (ACerS)  
Society of Women Engineers (SWE)  
Engineers for a Sustainable World (ESW)  
American Association for the Advancement of Science (AAAS)  
Council for Undergraduate Research (CUR)  
Tau Beta Pi Engineering Honor Society  
Alpha Sigma Mu Materials Honor Society: Cal Poly Student Chapter Faculty Advisor  
Phi Kappa Phi Honor Society  
Mortar Board Honor Society  
Sigma Xi Research Honor Society  
Order of the Engineer

### **CAL POLY DUTIES**

Faculty Advisor to Materials Research Society (MRS) University Chapter, 1999-2004  
    AMS-TMS Student Chapter, 1999-2004  
    Alpha Sigma Mu Materials Honor Society, 2000-present  
    Cal Poly Salsa Dance Club, 2000-2004  
    Society of Women Engineers (SWE) Team Tech, 2003-2004  
    Society of Women Engineers (SWE) Cal Poly student chapter, 2004-present  
MATE Department Outreach Coordinator, 1999-present  
MATE Fee Initiative Committee, 2002-present  
Status of Women Committee (CENG representative), 2001-2006  
Technology Park Academic Advisory Committee, 2004-2006  
Women in Science and Technology Lecture Series Committee, 2000-2001  
CENG workload taskforce, 2006

### **HONORS AND AWARDS**

Lockheed Martin Endowed Professorship, CENG, 2004-2006  
Northrop Grumman Excellence in Teaching Award, CENG, May 2003  
Most Supportive Professor Award, Cal Poly SWE, 2003  
Outstanding Faculty Advisor Award, Cal Poly Engineering Student Council, May 2001  
Los Alamos National Laboratory Teamwork Award, Sept. 1999