

Hu, Qiyang

Mechanical Engineering Ph.D.

3260 Sawtelle Blvd. #104
Los Angeles, CA 90066
310-825-8917(office)
Email: huqy@ucla.edu

RESEARCH INTEREST

- ▶ Computational material modeling of self-assembled microstructure evolution.
- ▶ Atomistic (MD, MC) simulation on nanosized material behavior.
- ▶ Surface properties of coating and thin films during epitaxial growth.
- ▶ Thermal & plastic mechanical analysis of solid structures.

EDUCATION

- 2000–2006 Mar. *Ph.D. in Mechanical Engineering, University of California, Los Angeles (UCLA)*
- MAJOR: Solid and Structural Mechanics (GPA 4.0)
 - MINOR: (i) Manufacture and Design (GPA 3.8); (ii) Physics (All A+'s)
- 1997–2000 *M.S. in Solid Mechanics, Tsinghua University, Beijing, China (GPA 3.8)*
- 1993–1997 *B.S. in Engineering Mechanics, Tsinghua University, Beijing, China (GPA 3.7)*

RESEARCH ACTIVITIES

- 2006–Present *Post-doctoral Research Fellow, University of California, Los Angeles (UCLA)*
- (1) Modeling of nano-layer and nano-twin structures: using Molecular Dynamics to study the mechanical responses and defect generations of Cu/Ag nanolayers and Cu nanotwin structures formed during electrodeposition processes. Bridging with Finite element techniques, a multiscale computation structure is to be developed for new emerging nanostructures.
 - (2) Modeling of nanoelectronics fabrication: Applying the modeling framework of my Ph.D. thesis on guided self-organizations to design innovative fabrication methods by optical-piezoelectric effect and polarized polymer and cells.
 - (3) Simulation of thermal and irradiation damages in materials: calibrating by various experiments the developed unified HEROS code which can facilitate not only the calculation of thermal impact and plastic deformation by energetic ions implemented into chamber materials, but also an understanding of defect and damage evolution in the wall structures. structures formed during electrodeposition processes.
- 2000–2006 *Research Assistant, University of California, Los Angeles (UCLA)*
- (1) (Ph.D. Thesis) Conducting research on multi-scale modelling (atomistic & continuum) of “directed” self-assembling process of quantum dots and wires on semiconductor surfaces guided by applying the external strain and/or laser fields.
 - (2) Conducting research in thermal/nuclear burn damage analysis in chamber materials and developed Helium-bubble release code (HEROS) in FORTRAN 90 to solve the extreme stiff partial differential equations (PDE), which is successfully applied in High Average Power Laser (HAPL) Program and in ITER Program.
 - (3) Collaboratively designed the material system for internal fusion energy final optics under laser pulses. My work is on investigating the laser-induced damage threshold (LIDT) of the mirror and formulating its thermo-mechanical deformations.
- 1998–2000 *Research Assistant, Tsinghua University, Beijing, China*
- (M.S. Thesis) Developed a modified Bodner-Partom plastic model to describe the thermo-mechanical fatigue of fiber-reinforced metal matrix composites (MMCs) with ultra-thin coatings.
- 1995–1997 *Research Assistant, Tsinghua University, Beijing, China*
- (B.S. Thesis) Performed Finite Element analysis via ANSYS on predicting the strength of a huge cooling water container and pipes for a coal mining.

JOURNAL PUBLICATIONS

- (1) Qiyang Hu, Nasr M. Ghoniem, Daniel Walgraef. Influence of substrate-mediated interactions on the self-organization of ad-atom clusters. *Physical Review B*, v75, 075405, 2007.
- (2) Qiyang Hu, Nasr M. Ghoniem. The Early Stages Of Quantum Dot Self-Assembly: A Kinetic Monte Carlo Simulation. *Journal of Computational and Theoretical Nanoscience*, 3:696-701, 2006 .
- (3) Qiyang Hu, Nasr M. Ghoniem. Nano-wire fabrication by directed self-assembly of ad-atoms on strained substrates. *Nanotechnology* (submitted).
- (4) Qiyang Hu, Shahram Sharafat, Nasr M. Ghoniem, Modeling Space-Time Dependent Helium Bubble Evolution in Tungsten Armor under IFE Conditions, *Fusion Science and Technology*, 2007. (accepted).
- (5) L.S. Niu, Y. Zheng, Qiyang Hu and H.J. Shi. Mechanical model of fiber reinforced MMCs under cyclic thermomechanical loading. *Journal of Mechanical Strength*, vol.26, No.z1 pp:110-4, 2004.
- (6) H.J. Shi, Qiyang Hu, L.S. Niu and Z.G. Wang. Review on modeling of thermomechanical fatigue behavior for fiber-reinforced metal matrix composites, *Advances in Mechanics*, Vol. 32(1) (2002) 81-91.
- (7) L.S. Niu, L. Cheng, Qiyang Hu and H.J. Shi. Analysis of thermo-residual stress in production on fiber reinforced aluminum matrix composites. *International Journal of Materials and Product Technology*, SPM Vol. 1 :257-62, 2001.
- (8) L.S. Niu, Qiyang Hu and H.J. Shi. Micromechanics Model of the Thermo-residual Stress for Fiber Reinforced Alumium Matrix Composites, *Journal of Aeronautical Materials*, Vol. 21 (1), (2001) pp 36-42.
- (9) L.S. Niu, Qiyang Hu and W. Wang. Mixed mode fracture for notched structures, *NATO Advanced Research Workshop on Notch Effects in Fatigue and Fracture*, Notch Effects in Fatigue and Fracture, Dures: 117-126, 2001. ISBN: 0-7923-6841-X

CONFERENCE PUBLICATIONS

- (1) Qiyang Hu, Nasr M. Ghoniem, Daniel Walgraef. Atomistic modelling of mono-layer surface atomic clusters. *Technical Proceedings of the 2005 NSTI Nanotechnology Conference and Trade Show, Anaheim, California*, 2:306-9, 2005.
- (2) Qiyang Hu, Nasr M. Ghoniem, Daniel Walgraef. Multiscale modelling of self-organized mono-layer surface atomic clusters. *Proceedings of Second International Conference on Multiscale Materials Modelling*, 1:70-2, 2004.
- (3) L.S. Niu, Q.Y. Hu, H. J. Shi and C. Robin. Model of Mechanics for Fiber Reinforced Ti alloy Matrix Composites under Thermomechanical Loading, *10th International Congress of Fracture*, Hawaii, (2001), pp. A247.

POSTERS

- (1) "Modeling Space-Time Dependent Helium Bubble Evolution in Tungsten Armor under IFE Conditions", Qiyang Hu, Shahram Sharafat, Nasr M. Ghoniem. Posted at 17th ANS Topical Meeting on the Technology of Fusion Energy (TOFE), Albuquerque, NM, Nov. 13th-15th, 2006
- (2) "Modeling of Helium Implantation in SiC ", Qiyang Hu, Shahram Sharafat, Nasr M. Ghoniem. Posted at 14th High Average Power Laser Program Workshop, Oak Ridge National Laboratory, TN, March 21st-22nd, 2006
- (3) "Modeling of Implanted Helium in IFE First Wall Tungsten Armor", Qiyang Hu, Shahram Sharafat, Nasr M. Ghoniem. Posted at 12th High Average Power Laser Program Workshop, Lawrence Livermore National Laboratory, CA, June 20th, 2005
- (4) "Multiscale modelling of self-organized mono-layer surface atomic clusters.", Qiyang Hu, Nasr M. Ghoniem, Daniel Walgraef. Posted at Second International Conference on Multiscale Materials Modelling, UCLA, Oct. 12th, 2004

ORAL PRESENTATIONS

- (1) “*Unified HEROS Code for Heat and Ion Implantation Profile Calculations under IFE Conditions*”. Presented at 16th High Average Power Laser Program Workshop, Princeton Plasma Physics Laboratory, Princeton, NJ, Dec. 13th, 2006
- (2) “*On the competition between directed and inherent self-organization for the assembly of quantum dots*”. Presented at MRS Fall meeting, Boston, MA, 2006
- (3) “*Ion Implantation and Temperature Modeling*”. Presented at 15th High Average Power Laser Program Workshop, General Atomics, San Diego, CA, Aug. 8th, 2006
- (4) “*Spatial Kinetic Rate Theory: HEROS*”. Presented at HAPL MWG Workshop: Ion Transport and Surface-Thermomechanics in W and SiC Armor, Los Angeles, CA, May 15th, 2006
- (5) “*Nano-wire fabrication by directed self-assembly of ad-atoms on strained substrates*”. Presented at 7th World Congress on Computational Mechanics, Los Angeles, CA, Jul. 17th, 2006
- (6) “*The Mechanics of Quantum Dot and Surface Island Evolution*”. Presented at 8th US National Congress on Computational Mechanics, Austin, TX, Jul. 25th, 2005
- (7) “*Multiscale Modeling of Self-Organized Mono-layer Surface Atomic Clusters: Kinetic Monte Carlo Simulations*”. Presented at 2005 NSTI Nanotechnology Conference and Trader Show, Anaheim, CA, May 8th, 2005
- (8) “*Self-Assembly of Quantum Dots by the Stress Field of Interfacial Dislocations in Multi-Layer Thin Films*”. Presented at 7th US National Congress on Computational Mechanics, Albuquerque, NM, Jun 28th, 2003
- (9) “*Nano-Scale Engineering of Self-Assembled Quantum Dots*”. Presented at 2003 MAE Research & Technology Review Session B. III, UCLA, May 2nd, 2003
- (10) “*Self-Assembled of Quantum Dots with Interfacial Dislocation Arrays*”. Presented at 2002 MAE Research & Technology Review Session II, UCLA, May 10th, 2002

HONORS

- ★ Beijing City Honor Student (1993)
- ★ Tsinghua Excellent Student Scholarship (93-94, 94-95, 95-96)
- ★ Tsinghua Excellent Graduate Cast Scholarship (98-99)
- ★ Tsinghua Excellent Social Work Awards for Graduates (95-96, 97-98, 98-99)
- ★ UCLA MAE Graduate Student Fellowship (00-01)