Wei Cai

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Professional Preparation

Huazhong University of Science and Technology, Wuhan, China, Optoelectronic Engineering, B.S. 1995
Massachusetts Institute of Technology, Cambridge, MA, Nuclear Engineering, Ph.D. 2001
Lawrence Livermore National Laboratory, Livermore, CA Lawrence Postdoctoral Fellow, 2001-2004

Appointments

2017-present Chair of the Mechanics and Computation Division,
Department of Mechanical Engineering, Stanford University
2019-present Professor, Department of Mechanical Engineering, Stanford University
2011-2019 Associate Professor, Department of Mechanical Engineering, Stanford University
2004-2011 Assistant Professor, Department of Mechanical Engineering, Stanford University

Publications

Five Products Most Closely Related to This Proposal

1. R. B. Sills, N. Bertin, A. Aghaei and W. Cai, "Dislocation networks and the microstructural origin of strain hardening", *Phys. Rev. Lett.* 121, 085501 (2018).
2. Y. Wang, P. Woytowitz, D. Mui and W. Cai, "Predicting Stability of Nano-Fin Arrays Against Collapse by Phase Field Modeling", *Journal of Vacuum Science & Technology B*, 36, 051602 (2018).
3. X. Zhang, Y. Wang and W. Cai, "Anisotropy effect on strain-induced instability during growth of heteroepitaxial films", *Journal of Materials Science*, 53, 5777 (2018).
4. Y. Li, Y. Wang, S. Ryu, A. F. Marshall, W. Cai and P. C. McIntyre, "Spontaneous, defect-free kinking via capillary instability during vapor-liquid-solid nanowire growth", *Nano Lett.,* 16, 1713 (2016).
5. Y. Wang, S. Ryu and W. Cai, "A three-dimensional phase field model for vapor-liquid-solid growth of semiconductor nanowires", *Modelling and Simulation in Materials Science and Engineering*, 22, 055005 (2014).

Five Other Significant Products

6. R. Ramachandramoorthy, Y. Wang, A. Aghaei, G. Richter, W. Cai and H. D. Espinosa, "Reliability of Single Crystal Silver Nanowire-Based Systems: Stress Assisted Instabilities", ACS Nano, **11**, 4768 (2017).
7. K. Kang and W. Cai, "Size and Temperature Effects on Brittle and Ductile Fracture of Silicon Nanowires", Int. J. Plasticity, 26, 1387 (2010).
8. K. Kang, V. V. Bulatov and W. Cai, "Singular Orientation and Faceted Motion of Dislocations in Body-Centered Cubic Crystals", *Proc. Natl. Acad. Sci. USA,* **109**, 15174 (2012).
9. C. R. Weinberger and W. Cai, "Surface Controlled Dislocation Multiplication in Metal Micro-Pillars", *Proc. Natl. Acad. Sci. USA*, **105**, 14304 (2008).
10. W. Cai, A. Arsenlis, C. R. Weinberger, V. V. Bulatov, "A non-singular continuum theory of dislocations", *Journal of the Mechanics and Physics of Solids*, **54**, 561 (2006).

Synergistic Activities

1. I was the chair of the *7th International Conferences on Multiscale Materials Modelling* (MMM 2014) held in Berkeley Marina, California (http://mmm2014berkeley.iop.org). I also co-organized the *Dislocations 2008* international conference in Hong Kong.
2. I co-authored a senior undergraduate / junior graduate level textbook, "Imperfections in Crystalline Solids", Cambridge University Press, September, 2016, and a graduate textbook, "Computer Simulations of Dislocations", Oxford University Press, October, 2006. I am maintaining the companion web sites http://ics-book.stanford.edu and http://micro.stanford.edu where students can download source code and example input scripts to solve homework problems.
3. I am a major developer for the Parallel Dislocation Simulator (ParaDiS), a massively parallel simulation code that is now used in many research groups worldwide. I am developing innovative tools (MD++ and DDLab) to aid in teaching beginning students about atomistic and dislocation dynamics simulations. As a former member of the DOE-sponsored Computational Materials Science Network (CMSN), I am maintaining a web repository of codes and tutorials on simulation tools for material microstructures (http://paradis.stanford.edu, http://micro.stanford.edu/wiki/MD++_Manuals).
4. I collaborated with high school teachers in the *Latino College Preparatory Academy* (LCPA) in San Jose to develop innovative teaching modules based on MD++ to increase high school students' interest in science. (http://www.stanford.edu/~caiwei/video/outreach.html) Developing the modules creates undergraduate research opportunities and the resulting simulation movies will be used in the core undergraduate course *Strength of Materials*.
5. I am serving on the editorial board of *Modelling and Simulation in Materials Science and Engineering* (MSMSE).

Awards

2013	ASME T. J. R. Hughes Young Investigator Award
2009	ASEE Beer & Johnston Outstanding New Mechanics Educator Award
2006	AFOSR Young Investigator Program Award
2006	NSF Career Award
2004	Presidential Early Career Award for Scientists and Engineers (PECASE)