Curriculum Vitae for Jeong-Hyun Cho

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EDUCATIONAL BACKGROUND

- 08/2004 - 11/2007 **Ph.D., Engineering Science**
  Washington State University, Pullman, Washington.
- 01/2003 - 07/2004 **M.S., Engineering**
  Washington State University, Pullman, Washington.
- 08/2002 - 12/2002 Mechanical Engineering, Undergraduate Classes
  Washington State University, Pullman, Washington.
- 03/1993 - 02/2001 **B.S. Control and Instrument Engineering**
  HoSeo University, Asan, South Korea.

WORK EXPERIENCE

- 05/2010 – Present Postdoctoral Fellow
  Center for Integrated Nanotechnologies (CINT)
  Los Alamos National Laboratory
  Advisor: Dr. S. Tom Picraux
- 01/2008 – 04/2010 Postdoctoral Fellow
  Micro / Nanotechnology and Interfacial Science in Electronics and Medicine Lab, Johns Hopkins University
  "Enabling Surface Patterning On Polyhedral and Curved Nanoparticles" Advisor: Dr. David H. Gracias.
- 01/2003 - 12/2007 Graduate Research Assistant
  MEMS Lab, Washington State University
  "Power Production by a Dynamic Micro Heat Engine with Integrated MEMS Thermal Switch"
  "Electro-Mechanical Characterization of Piezoelectrics for MEMS Power"
  Worked on a Defense Advanced Research Projects Agency (*DARPA*) and US Army Space & Missile Defense Command (*SMDC*) project to develop a macro and micro scale power generator.
  Advisor: Dr. Cecilia D. Richards.
- Teaching Assistant
  01/2009 - 04/2010 Johns Hopkins University, CHEMBE 540.440: Micro & Nanotechnology
  01/2007 - 05/2007 Washington State University, ME 404: Heat Transfer.

PUBLICATIONS IN REFEREED ARCHIVAL JOURNALS

[1] **J. H. Cho**, D. Datta, S. Y. Park, V. Shenoy, and D. H. Gracias, "Plastic Deformation Drives Wrinkling, Saddling, and Wedging of annular bilayer nanostructures," *Nano Letters*, DOI: 10.1021/nl1035447, 2010.

[2] T James, **J. H. Cho**, R Fernandes, J. S. Randhawa, and D. H. Gracias, "A one-step etching method to produce gold nanoparticle coated silicon microfluidic structures," *Analytical and Bioanalytical Chemistry*, DOI:10.1007/s00216-010-4260-0, 2010.

[3] **J. H. Cho**, Anum Azam, and David H. Gracias, "Three Dimensional Nanofabrication Using Surface Forces," *Langmuir*, Vol 26, 16534-16539, 2010.

[4] **J. H. Cho**, T. James, and D. H. Gracias, "Curving Nanostructures Using Extrinsic Stress," *Advanced Materials,* Vol 22, 2320-2324, 2010.
[Selected for the Cover Image, Featured in Nanowerk].

[5] M. Jamala, N. Bassika, **J. H. Cho**, C. L. Randallc, and D. H. Gracias, "Directed Growth of Fibroblasts into Three Dimensional Micropatterned Geometries via Self-Assembling Scaffolds," *Biomaterials,* Vol 31 1683-1690, 2010.

[6] A Hamdan, **J. H. Cho**, R Johnson, J Jiao, D Bahr, R Richards, and C Richards, "Evaluation of a Thermal Interface Material Fabricated using Thermocompression Bonding of Carbon Nanotube Turf," *Nanotechnology*, Vol 21, 015702, 2009.

[7] **J. H. Cho** and D. H. Gracias, "Self-assembly of Lithographically Patterned Nanoparticles," *Nano Letters*, Vol 9, 4049-4052, 2009.

[Featured in Nature Photonics, Chemistry World, Technology Review published by MIT, New Scientist magazine].

[8] P. Tyagi, N. Bassik, T. G. Leong, **J. H. Cho**, B. R. Benson, and D. H. Gracias, "Self-assembly Based on Chromium / Copper Bilayers," *Journal of Microelectromechanical System,* Vol 18, 784-791, 2009.

[9] **J. H. Cho**, C. S. Lin, C. D. Richrds, R. F. Richards, J. Ahn, and P. D. Ronney, "Demonstration of an External Combustion Micro-heat Engine," *The Proceedings of the Combustion Institute,* Vol. 32, 3099-3105, 2009.

[10] **J. H. Cho**, S. Hu, and D. H. Gracias, "Self-assembly of Orthogonal Three-axis Sensors," *Applied Physics Letters,* Vol. 93, 043505, 2008.

[11] **J. H. Cho**, C. D. Richards, D. F. Bahr, J. Jiao, and R. F. Richards, "Evaluation of Contacts for a MEMS Thermal Switch," *Journal of Micromechanics and Microengineering*, Vol. 18, 105012, 2008.

[12] **J. H. Cho**, C. D. Richards, and R. F. Richards, "A Facility for Characterizing the Steady-state and Dynamic Thermal Performance of Microelectromechanical System Thermal Switches," *Review of Scientific Instruments,* Vol. 79, 034901, 2008.

[13] **J. H. Cho**, L. W. Weiss, C. D. Richards, D. F. Bahr, and R. F. Richards, "Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch," *Journal*

of Micromechanics and Microengineering, Vol. 17, S217–S223, 2007. **[*Invited Paper*]**.

[14] **J. H. Cho**, R. F. Richards, D. F. Bahr, and C. D. Richards, "Development of Noncontact Spring Constant Measurement and Deflection Characterization of Piezoelectric Devices," *Journal of Applied Physics*, Vol. 101, 044104, 2007.

[15] **J. H. Cho**, T. Wiser, C. D. Richards, D. F. Bahr, and R. F. Richards, "Fabrication and Characterization of a Thermal Switch," *Sensors and Actuators A,* Vol. 133, Issue 1, 55-63, 2007.

[16] O. Al-Hattamleh, **J. H. Cho**, R. F. Richards, D. F. Bahr, and C. D. Richards, "The Effect of Design and Process Parameters on Electromechanical Coupling for a Thin-film PZT Membrane," *Journal of Microelectromechanical System*, Vol. 15, Issue 6, 1715-1725, 2006.

[17] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards, "Efficiency of Energy Conversion by Piezoelectrics," *Applied Physics Letters*, Vol. 89, 104107, 2006.

[18] L.W. Weiss, **J. H. Cho**, K.E. McNeil, C. D. Richards, D. F. Bahr, and R. F. Richards, "Characterization of a dynamic micro heat engine with integrated thermal switch," *Journal of Micromechanics and Microengineering*, Vol. 16, S262-S269, 2006.

[Selected for the Cover Image, Invited Paper].

[19] M. C. Robinson, D. J. Morris, P. D. Hayenga, **J. H. Cho**, C.D. Richards, R. F. Richards, and D.F. Bahr, "Structural and Electrical Characterization of PZT on Gold for Micromachined Piezoelectric Membranes," *Applied Physics A*, 85, 135-140, 2006.

[20] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards, "Optimization of Electromechanical Coupling for a Thin Film PZT Membrane: part II. Experiment," *Journal of Micromechanics and Microengineering*, Vol. 15, 1804-1809, 2005.

[21] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards, "Optimization of Electromechanical Coupling for a Thin Film PZT Membrane: part I. Modeling," *Journal of Micromechanics and Microengineering*, Vol. 15, No. 10, 1797-1803, 2005.

INTERNATIONAL PRESS REPORTS ON MY RESEARCH ACHIEVEMENTS

[1] Nanowerk, "Stress is good for nanofabrication," April 16 2010. http://www.nanowerk.com/spotlight/spotid=15835.php

[2] Nature Photonics, Research Highlights, "Self-assembly of nanocubes" January 2010.

[3] Chemistry World, "New nanoboxes take shape," August 20, 2009. http://www.rsc.org/chemistryworld/News/2009/August/20080902.asp

[4] Technology Review published by MIT, "First 3-D Patterned Nanostructures," August 20, 2009. http://www.technologyreview.com/blog/editors/24022/

[5] *New Scientist* magazine, "Folded nanoboxes could open door to nano-circuits," Issue 2723 August 29 2009. http://www.newscientist.com/article/mg20327236.600-folded-nanoboxes-could-open-door-to-nanocircuits.html

BOOK CHAPTERS

[1] S. Hu, **J. H. Cho**, and D. H. Gracias, "Building Three dimensional Nanostructured Devices by Self-Assembly," in Three-Dimensional Nanoarchitectures: Designing Next-Generation Devices, Editors Weilie Zhou and Zhong Lin Wang, Springer, 2010.

PATENTS

[1] D. H. Gracias and **J. H. Cho**, "Self-assembly of Lithographically Patterned Polyhedral Nanostructures and Formation of Curving Nanostructures" *Patent Application* 61/1773427, 2009. U.S. Patent Pending

PUBLICATIONS IN REFEREED CONFERENCE AND SYMPOSIUM PROCEEDINGS

[1] **J. H. Cho**, T. James, and D. H. Gracias, "Fabrication of 3D Nanostructures with Lithographically Patterned Surfaces by Self-folding," *SPIE Proceedings,* Vol. 7767, 776704, 2010.

[2] **J. H. Cho**, S. Hu, and D. H. Gracias, "A Three Dimensional Self-folding Package (SFP) for Electronics," *Material Research Society Symposium Proceedings,* Vol. 1249, 1249-F09-07, 2010.

[3] **J. H. Cho**, E. W. Cha, and D. H. Gracias, "A Facile Method for Patterning Substrates with Zinc Oxide Nanowires," *Material Research Society Symposium Proceedings* Vol. 1174, 1174-V07-01, 2009.

[4] **J. H. Cho**, C. Lin, C. D. Richrds, R. F. Richards, and J. Ahn, "Demonstration of an external combustion micro-heat engine", *The 8th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS 2008) and The 2nd MEMS (Micro Environmental Machine Systems) Symposium*,397-400, 2008.

[5] **J. H. Cho**, L. W. Weiss, C. D. Richards, D. F. Bahr, and R. F. Richards, "Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch," *PowerMEMS 2006*, 9-12, 2006. *(The Journal of Micromechanics and Microengineering (JMM) has invited this paper to be submitted for consideration in a special Power MEMS issue of the journal to appear fall 2007.)*

[6] L. W. Weiss, **J. H. Cho**, D. J. Morris, D. F. Bahr, C. D. Richards, and R. F. Richards, "A MEMS-Based Micro Heat Engine with Integrated Thermal Switch," *Proceedings of the ASME International Congress*, IMECE2006-15042, 2006.

[7] **J. H. Cho**, C. D. Richards, D. F. Bahr, J. Jiao, and R. F. Richards, **"**Dynamic Operation of a MEMS Thermal Switch," *Proceedings of the ASME International Congress*, IMECE2006-15286, 2006.

[8] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards, "Generated Power Characterization of Piezoelectrics with Coupling Coefficient and Quality Factor," *2006 IEEE Ultrasonics Symposium,* 485-488, 2006.

[9] **J. H. Cho**, C. D. Richards, J. Jiao, D. F. Bahr, and R. F. Richards, "Design & Characterization of a MEMS Thermal Switch," *Solid-State Sensors, Actuators, and Microsystems Workshop*, 272-275, 2006.

[10] M. J. Anderson, **J. H. Cho**, C. D. Richards, D. F. Bahr, and R. F. Richards, "A Comparison of Piezoelectric and Electrostatic Electromechanical Coupling for Ultrasonic Transduction and Power Generation," *2005 IEEE Ultrasonics Symposium*, Vol. 2, 950-955, 2005.

[11] M. C. Robinson, P. D. Hayenga, **J. H. Cho**, D. F. Bahr, C. D. Richards, and R. F. Richards, "Fabrication Methods for Improved Electromechanical Behavior in Piezoelectric Membranes," *Material Research Society Symposium Proceedings* Vol. 872, J18.26.1, 2005.

[12] **J. H. Cho**, J. C. Raupp, P. D. Hayenga, R. F. Richards, D. F. Bahr, and C. D. Richards**,** "Efficiency Characterization of Piezoelectrics for MEMS Power," *Proceedings of the ASME International Congress*, IMECE2004-61739, 2004.

[13] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards "Analysis of Micromachined PZT Membranes for MEMS Power," *Technical Proceedings of the 2004 NSTI Nanotechnology Conference and Trade Show*, Vol. 1, 382-385, 2004.

PUBLISHED ABSTRACTS AND PRESENTATIONS

[1] **J. H. Cho**, S. Y. Park, T. James, and D. H. Gracias, "Self-folding and Curving Lithographically Patterned Nanostructures," *Materials Research Society Fall Meeting*, 2010.

[2] **J. H. Cho**, X. Li, and S. T. Picraux, "Silicon Nanowire Growth and Li-ion Cycling: Minimizing Substrate Effects," *NEES Semi Annual Meeting*, 2010.

[3] **J. H. Cho**, T. James, and D. H. Gracias, "Enabling Surface Patterning on Polyhedral and Curved Nanoparticles," *AVS International Symposium and Exhibition*, 2010.

[4] S. T. Picraux, S. A. Dayeh, **J. H. Cho**, A. D. Mohite, H. Han, D. E. Perea, and I. H. Campbell, "Silicon Nanowires for Energy Storage and Harvesting," *COMS (Commercialization Of Micro-Nano Systems) Conference*, 2010.

[5] **J. H. Cho**, T. James, and D. H. Gracias, "Fabrication of 3D Nanostructures with Lithographically Patterned Surfaces by Self-folding," *SPIE conference*, 2010.

[6] N. Bassik, **J. H. Cho**, G. Stern, and D. H. Gracias, "Metamaterial Fabrication using Self-folding Lithographically Patterned Sheets," *SPIE conference*, 2010.

[7] **J. H. Cho** and D. H. Gracias "Self-folding of Lithographically Patterned Nanopolyhedra," *Materials Research Society Spring Meeting*, 2010.

Selected as a Best Poster Award Nominee.

[8] **J. H. Cho**, S. Hu, and D. H. Gracias, “A Three Dimensional Self-folding Package (SFP) for Electronics,” *Materials Research Society Spring Meeting*, 2010.

[9] **J. H. Cho**, T. James, and D. H. Gracias “Self-assembly of Curved Nanostructures,” *Materials Research Society Spring Meeting*, 2010.

[10] **J. H. Cho**, E. W. Cha, and D. H. Gracias, “A Facile Method for Patterning Substrates with Zinc Oxide Nanowires,” *Material Research Society Fall Meeting*, 2009.

[11] **J. H. Cho**, S. Hu, C. Kirkpatrick, and D. H. Gracias, “Self-assembly of Orthogonal 3-axis Magnetic Field Sensors,” *Materials Research Society Fall Meeting, 2009*.

[12] **J. H. Cho** and D. H. Gracias, “Three Dimensional Lithographic Patterning of Sub-micron Scale Polyhedral Devices by Self-assembly,” *Materials Research Society Fall Meeting*, 2009.

[13] **J. H. Cho**, S. Hu, and D. H. Gracias, “Self-Assembled 3D Cantilever Based Sensors,” *AIChE Annual Meeting*, 2008.

[14] R. Johnson, D. F. Bahr, C. D. Richards, R. F. Richards, **J. H. Cho**, A. Zbib, A. Hamdan, D. McClain, and J. Jiao, “Thermocompression Bonding of Gold Coated Carbon Nanotube Turfs for Heat Transfer Applications,” *TMS Annual Meeting*, 2008.

[15] **J. H. Cho**, C. Lin, C. D. Richrds, R. F. Richards, and J. Ahn, “Demonstration of an external combustion micro-heat engine”, *The 8th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS 2008) and The 2nd MEMS (Micro Environmental Machine Systems) Symposium*, 2008.

[16] **J. H. Cho**, J. Lee, C. S. Lin, L. Sanford, J. Huang, C. D. Richards, R. F. Richards, and J. Ahn, “Demonstration of an External Combustion Micro-heat Engine,” *Western States Meeting of the Combustion Institute*, 2007.

[17] **J. H. Cho**, C. D. Richards, D. F. Bahr, and R. F. Richards, “Variable Conductance MEMS via Micro Thermal Switches,” *DARPA MTO Microsystems technology symposium*, 2007.

[18] T. J. Kim, **J. H. Cho**, C. D. Richards, D. F. Bahr, R. F. Richards, and M. A. Osman, “Thermal Properties of Carbon Nanotubes,” *William R. Wiley Exposition of Graduate and Professional Studies*, Washington State University, 2007.

[19] **J. H. Cho**, R. F. Richards, D. F. Bahr, and C.D. Richards, “Efficiency and Generated Power Characterizations of Piezoelectrics," *William R. Wiley Exposition of Graduate and Professional Studies*, Washington State University, 2007.

[20] **J. H. Cho**, L. W. Weiss, C. D. Richards, D. F. Bahr, and R. F. Richards, “Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch,” *PowerMEMS*, 2007.

[21] **J. H. Cho**, C. D. Richards, J. Jiao, D. F. Bahr, and R. F. Richards, “Design and Characterization of MEMS Thermal Switch," *William R. Wiley Exposition of Graduate and Professional Studies*, Washington State University, 2006.

Selected to receive *4th place* in Engineering and Physical Sciences.

[22] L. W. Weiss, **J. H. Cho**, D. J. Morris, D. F. Bahr, C. D. Richards, and R. F. Richards, “A MEMS-Based Micro Heat Engine with Integrated Thermal Switch,” *ASME International Mechanical Engineering Congress & Exposition*, 2006.

[23] **J. H. Cho**, C. D. Richards, D. F. Bahr, J. Jiao, and R. F. Richards, **“**Dynamic Operation of a MEMS Thermal Switch,” *ASME International Mechanical Engineering Congress & Exposition*, 2006.

[24] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards, “Generated Power Characterization of Piezoelectrics with Coupling Coefficient and Quality Factor,” *2006 IEEE Ultrasonics Symposium,* 2006.

[25] **J. H. Cho**, C. D. Richards, J. Jiao, D. F. Bahr, and R. F. Richards, “Design & Characterization of a MEMS Thermal Switch,” *Solid-State Sensors, Actuators, and Microsystems Workshop*, 2006.

[26] M. J. Anderson, **J. H. Cho**, C. D. Richards, D. F. Bahr, and R. F. Richards, “A Comparison of Piezoelectric and Electrostatic Electromechanical Coupling for Ultrasonic Transduction and Power Generation,” *2005 IEEE Ultrasonics Symposium*, 2005.

[27] M. C. Robinson, P. D. Hayenga, **J. H. Cho**, D. F. Bahr, C. D. Richards, and R. F. Richards, “Fabrication Methods for Improved Electromechanical Behavior in Piezoelectric Membranes,” *Materials Research Society Spring Meeting,* 2005.

[28] M. C. Robinson, P. D. Hayenga, **J. H. Cho**, D. J. Morris, C. D. Richards, R. F. Richards, and D. F. Bahr, “Structural and Electrical Characterization of PZT On Gold for Micromachined Piezoelectric Membranes,” *Materials Research Society Fall Meeting*, 2005.

[29] **J. H. Cho**, C. McCarter, D. F. Bahr, C. D. Richards, R. F. Richards, J. Jiao, "Design and Characterization of MEMS Thermal Switch," *Micro Nano Breakthrough Conference*, 2005.

[30] M. C. Robinson, P. D. Hayenga, **J. H. Cho**, D. F. Bahr, C. D. Richards, and R. F. Richards., “Improved Electrical Power Behavior in the P^3 Microengine,” *Washington State University Showcase Session*, 2005.

[31] **J. H. Cho**, R. F. Richards, D. F. Bahr, and C. D. Richards, “Efficiency Characterization of Piezoelectrics for MEMS Power,” *William R. Wiley Exposition of Graduate and Professional Studies*, Washington State University, 2005.

Selected to receive *3rd place* in Engineering and Physical Sciences.

[32] **J. H. Cho**, J. C. Raupp, P. D. Hayenga, R. F. Richards, D. F. Bahr, and C. D. Richards**,**

"Efficiency Characterization of Piezoelectrics for MEMS Power," *ASME International Mechanical Engineering Congress & Exposition*, 2004.

[33] **J. H. Cho**, M. J. Anderson, R. F. Richards, D. F. Bahr, and C. D. Richards "Analysis of Micromachined PZT Membranes for MEMS Power," *NSTI Nanotechnology Conference and Trade Show*, 2004.

[34] J. V. Martinez, L. M. R. Eakins, **J. H. Cho**, C. D. Richards, R. F. Richards, and D. F. Bahr, "Design and Selection of Thin Film Piezoelectric Materials for Micro-Power Generation," *Materials Research Society Fall Meeting*, 2003.

INVITED SEMINARS

[1] "Power Production by a Dynamic Micro Heat Engine & Self-assembly of Lithographically Patterned Micro- and Nanoparticles," Los Alamos National Laboratory, Los Alamos, New Mexico, USA, January 26, 2010.

[2] "Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch," University of California, Davis, California, USA, April 10, 2008.

[3] "Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch," University of Louisville, Louisville, Kentucky, USA, August 28, 2007.

[4] "Introduction to MEMS & NEMS," ME 310: Manufacturing Processes Class, Washington State University, Pullman, Washington, USA, April 11, 2007.

[5] "Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch," Korea Institute of Science and Technology, Seoul Korea, January 4, 2007.

SCHOLARSHIPS & AWARDS

- 2010 • Best Poster Award Nominee, 2010 Materials Research Society (MRS) Spring Meeting.
- 2010 • Raith Micrograph Award 2009 "Special Art Award"
- 2007 • Outstanding Graduate Seminar Award, in the Physical Chemistry and Materials Science Seminar Program, Washington State University, Pullman, Washington, 2006-2007.
- 2006 • Outstanding Researcher Award (Ph.D.) in the School of Mechanical and Materials Engineering, Washington State University, Pullman, Washington, 2005-2006.
- 2006 • Student Travel Support for 2006 IEEE International Ultrasonics Symposium.
- 2005 • Wiley Research Exposition 4th place in Engineering and Physical Sciences, Washington State University, Pullman, Washington.
- 2004 • Wiley Research Exposition 3rd place in Engineering and Physical Sciences, Washington State University, Pullman, Washington.
- 2002 • Travel Grant from the Graduate and Professional Student Association,

Washington State University, Pullman, Washington.

- 1997 - 2000 • President's Academic Scholarship Based on Academic Performance, 1st place three times, 2nd place one time, and 4th place one time. HoSeo University, Asan, South Korea.
- 1999 • Faculty Committee Scholarship, HoSeo University, Asan, South-Korea.
- 1996 • "Citation of the Colonel" for Outstanding Performance of Regimental Duties, Korean-Army Service, CheolWon, South Korea.

ACADEMIC SERVICE

- 2006 - 2007 • Head Editor in Korean Student Association, Washington State University, Pullman, Washington.
- 1993 • President of Computer Hardware Club, HoSeo University, Asan, South Korea.

REVIEWER FOR

- APL • Applied Physics Letters.
- JAP • Journal of Applied Physics.
- JMM • Journal of Micromechanics and Microengineering.
- UFFC • IEEE Ultrasonics, Ferroelectrics, and Frequency Control.

ARMY SERVICE

- 1995 – 1996 • Squad Commander, During Korean-Army Service, CheolWon, South Korea.
- 1994 - 1996 • Korean-Army Service, CheolWon, South Korea.