

Jiuning Hu

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RESEARCH INTERESTS	Understanding the thermal, electronic and spin transport in nanoscale systems.	
EDUCATION	Purdue University , West Lafayette, IN, USA Ph.D. candidate, School of Electrical and Computer Engineering (expected graduation date: May 2013) <ul style="list-style-type: none">• Adviser: Professor Yong P. Chen• Area of Study: Thermal and electronic transport in graphene Tsinghua University , Beijing, China M.S., Institute of Microelectronics, July 2008 <ul style="list-style-type: none">• Thesis Topic: <i>Spin Transport in Nanoscale Magnetic Multilayer</i>• Adviser: Professor Peiyi Chen• Area of Study: Spin transport in magnetic structures B.S., Department of Electronic Engineering, July 2006 <ul style="list-style-type: none">• Thesis Topic: <i>Research on Current-induced Magnetic Switching</i>• Adviser: Professor Peiyi Chen• Area of Study: Spin transport in magnetic structures	
AWARDS	Tsinghua University , Beijing, China <ul style="list-style-type: none">• Scholarship of Weilun Fund, 2004–2006• First Prize of Hardware Design Contest, 2005• Individual Practice Award in Electronic Technology Practice, 2004• Second Prize of China Undergraduate Mathematical Contest in Modeling, High Education Press Cup, 2004 QingYang DiYi ZhongXue , Gansu Province, China <ul style="list-style-type: none">• First Prize of National Mathematical Olympiad for High School, 2001	
ACADEMIC EXPERIENCE	Purdue University , West Lafayette, IN, USA <i>Research Assistant</i> August 2008 to present <ul style="list-style-type: none">• Thermoelectric and magneto transport in graphene stacks• Magneto-transport in high mobility graphene nanostructures• Molecular dynamics simulation of thermal transport in graphene nanoribbons• Development of graphene-based thermal interface materials <i>2009 NCN@Purdue Summer School</i> July 20–24, 2009 <ul style="list-style-type: none">• Nanostructured electronic devices• Colloquium on graphene physics and devices Tsinghua University , Beijing, China	

Teaching Assistant

September 2007 to January 2008

- Advanced Calculus B.

Graduate Research

August 2006 to July 2008

- Spin flip scattering effect at the ferromagnetic metal-normal metal interface
- Spin transfer and microwave emitting in the noncollinear multilayer stack
- Micromagnetic simulation with the spin transfer torque

Undergraduate Research

February 2006 to July 2006

- Macrospin model of current induced magnetic switching (CIMS) effect
- The diffusive equation and resistance boundary approach for CIMS effect.

Internship

July 2005 to August 2005

- Key Laboratory of 715 Institute, Hangzhou, China
- MEMS hydrophone based on pressure membrane with interdigital electrode capacity.

PUBLICATIONS

Preprints:

- **Jiuning Hu** and Yong P. Chen, “Existence of negative differential thermal conductance in one-dimensional diffusive thermal transport,” arXiv:1201.3054, 2012

Regular Journal Publications:

- Helin Cao, Jifa Tian, Ireneusz Miotkowski, Tian Shen, **Jiuning Hu**, Shan Qiao, and Yong P. Chen, “Quantized Hall Effect and Shubnikovde Haas Oscillations in Highly Doped Bi₂Se₃: Evidence for Layered Transport of Bulk Carriers,” *Phys. Rev. Lett.* **108**, 216803 (2012)
- K.G.S.H. Gunawardana, Kieran Mullen, **Jiuning Hu**, Yong P. Chen and Xiulin Ruan, “Tunable Thermal Transport and Mechanical Properties in Strained Graphene Nanoribbons,” *Phys. Rev. B* **85**, 245417 (2012)
- **Jiuning Hu**, Yan Wang, Ajit Vallabhaneni, Xiulin Ruan and Yong P. Chen, “Non-linear thermal transport and negative differential thermal conductance in graphene nanoribbons,” *Applied Physics Letters* **99**, 113101 (2011) (Selected as research highlight in *Nature Nanotechnology* 6, 609, 2011; Selected for *Virtual Journal of Nanoscale Science & Technology*, Vol. 24, Issue 13)
- **Jiuning Hu**, Stephen Schiffl, Ajit Vallabhaneni, Xiulin Ruan and Yong P. Chen, “Tuning the thermal conductivity of graphene nanoribbons by edge passivation and isotope engineering: a molecular dynamics study,” *Applied Physics Letters* **97**, 133107 (2010) (Selected for *Virtual Journal of Nanoscale Science & Technology*, Vol. 22, Issue 15)
- **Jiuning Hu**, Xiulin Ruan and Yong P. Chen, “Thermal Conductivity and Thermal Rectification in Graphene Nanoribbons: a Molecular Dynamics Study,” *Nano Letters* **9**, 2730 (2009)
- M. Ren, L. Zhang, **J. Hu**, N. Deng, and P. Chen, “A Macroscopic Model of Current-induced Magnetization Switching Effect Based on Magnetic Dynamic Equation,” *Acta Physica Sinica* **56**, 2863-2867 (2007)

Refereed Conference Publications:

- **Jiuning Hu**, Wonjun Park, Xiulin Ruan and Yong P. Chen, “Thermal conductivity measurement of graphene composite,” *Mater. Res. Soc. Symp. Proc.* xxxx-xx-xx, 2012

- **Jiuning Hu**, Xiulin Ruan and Yong P. Chen, “Molecular Dynamics Study of Thermal Rectification in Graphene Nanoribbons,” *International Journal of Thermophysics* **33**, 986 (2012)
- Ajit Vallabhaneni, **Jiuning Hu**, Yong Chen, and Xiulin Ruan, “Thermal Rectification In Graphene And Carbon Nanotube Systems Using Molecular Dynamics Simulations,” Proceedings of the ASME-JSME, AJTEC2011-44521, 2011
- Luis A. Jauregui, Yanan Yue, Anton N. Sidorov, **Jiuning Hu**, Qingkai Yu, Gabriel Lopez, Romaneh Jalilian, Daniel K. Benjamin, Derek A. Delk, Wei Wu, Zhihong Liu, Xinwei Wang, Zhigang Jiang, Xiulin Ruan, Jiming Bao, Steven S. Pei and Yong P. Chen, “Thermal Transport in Graphene Nanostructures: Experiments and Simulations,” 217th Electrochemical Society (ECS) Meeting (**invited paper**), *ECS Transactions* **28**, 73, 2010
- **Jiuning Hu**, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Molecular Dynamics Simulation of Melting and Vacancy Movement in Graphene Nanoribbons,” Proceedings of the 30th International Thermal Conductivity Conference and the 18th International Thermal Expansion Symposium, p.750, 2009
- **Jiuning Hu**, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Molecular Dynamics Calculation of Thermal Conductivity of Graphene Nanoribbons,” Frontiers of Characterization and Metrology for Nanoelectronics 2009, *AIP Conf. Proc.* **1173**, 135, 2009
- **Jiuning Hu**, Min Ren, Lei Zhang, Ning Deng, Hao Dong, and Peiyi Chen, “Effect of FM/NM Interfaces on Spin Accumulation in Free Layer of Pseudo-Spin-Valve Structure,” *Mater. Res. Soc. Symp. Proc.* **0998-J02-03**, 2007
- Min Ren, Lei Zhang, **Jiuning Hu**, Ning Deng, Hao Dong, and Peiyi Chen, “Nonlinear Damping Generated by Spin Injection in a Pseudo-spin-valve Structure,” *Mater. Res. Soc. Symp. Proc.* **0998-J02-04**, 2007
- Lei Zhang, Hao Dong, Ning Deng, Min Ren, **Jiu-Ning Hu** and Pei-Yi Chen, “Spin-polarized Thermionic Emission at the Interface of Ferromagnetic Metal and Organic Semiconductor,” *Proceedings of the 7th IEEE International Conference on Nanotechnology*, 220-223, August 2-5, 2007
- **Jiuning Hu**, Min Ren, Lei Zhang, Ning Deng, Hao Dong, and Peiyi Chen, “A Novel Boundary Approach for Spin Polarized Transport in Pseudo-Spin-Valve Structure,” *Proceedings of the 7th IEEE International Conference on Nanotechnology*, 224-228, August 2-5, 2007

Conference Reports:

- **Jiuning Hu**, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Negative Differential Thermal Conductance in Graphene Nanoribbons: Toward Graphene Thermal Circuits,” TECHCON Conference, 2009

PRESENTATIONS

Conference Talks (* indicates the presenter):

- Jiuning Hu*, “Synthetic graphene: material properties and applications” (**invited talk**), Virtual Conference on Nanoscale Science and Technology 2012, Chengdu, China (06/04/2012)
- Wonjun Park*, Jiuning Hu and Yong P. Chen, “Photoconductivity of Graphene-based Composite” (**refereed contributed talk**), MRS Spring meeting 2012, San Francisco, SF (04/13/2012)

- Jiuning Hu*, Wonjun Park, Xiulin Ruan and Yong P. Chen, “Thermal conductivity measurement of graphene composite” (**refereed contributed talk**), MRS Spring meeting 2012, San Francisco, SF (04/11/2012)
- Jiuning Hu*, Yan Wang, Ajit Vallabhaneni, Xiulin Ruan and Yong P. Chen, “Tunable thermal transport and negative differential thermal conductance in graphene nanoribbons” (**refereed contributed talk**), APS March meeting 2012, Boston, MA (02/27/2012)
- Jiuning Hu, Xiulin Ruan*, Tim Fisher and Yong P. Chen, “Graphene-based Thermal Interface Materials” (**invited talk**), Cooling Technology Research Center (CTRC) Annual Meeting, Purdue University, West Lafayette, IN (11/08/2011)
- Jiuning Hu*, Xiulin Ruan, Tim Fisher and Yong P. Chen, “Graphene-based Thermal Interface Materials” (**invited talk**), Cooling Technology Research Center (CTRC) Annual Meeting, Purdue University, West Lafayette, IN (05/10/2011)
- Jiuning Hu*, Xiulin Ruan, Tim Fisher and Yong P. Chen, “Graphene-based Thermal Interface Materials” (**invited talk**), Cooling Technology Research Center (CTRC) Annual Meeting, Purdue University, West Lafayette, IN (11/09/2010)
- Jiuning Hu*, Xiulin Ruan, Tim Fisher and Yong P. Chen, “Graphene-based Thermal Interface Materials” (**invited talk**), Cooling Technology Research Center (CTRC) Annual Meeting, Purdue University, West Lafayette, IN (05/12/2010)
- Jiuning Hu*, Xiulin Ruan, Tim Fisher and Yong P. Chen, “Graphene-based Thermal Interface Materials” (**invited talk**), Cooling Technology Research Center (CTRC) Annual Meeting, Purdue University, West Lafayette, IN (10/29/2009)
- Jiuning Hu*, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Negative differential thermal conductance in graphene nanoribbons: toward graphene thermal circuits,” 2009 TECHCON Conference on Technology and Talent for the 21st Century, Austin, TX (09/13/2009)
- Jiuning Hu*, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Thermal transport properties in graphene nanoribbons: a molecular dynamics study” (**refereed contributed talk**), 30th International Thermal Conductivity Conference (ITCC), Pittsburg, PA (09/01/2009)
- Jiuning Hu, Xiulin Ruan and Yong P. Chen*, “Engineering Thermal Conductivity in Graphene Nanostructures: a Molecular Dynamics Study” (**refereed contributed talk**), 17th Symposium on Thermal Physical Properties, Boulder, CO (06/25/2009)
- Jiuning Hu*, Xiulin Ruan, Zhigang Jiang, Yong P. Chen, “Thermal conductivity and thermal rectification in graphene nanoribbons: a molecular dynamics study,” Frontiers of Characterization and Metrology for Nanoelectronics 2009, Albany, NY (05/21/2009)
- Jiuning Hu*, Xiulin Ruan, Zhigang Jiang and Yong P. Chen, “Thermal conductivity and thermal rectification in graphene nanoribbons: a molecular dynamics study,” APS March meeting 2009, Pittsburgh, PA (03/17/2009)
- Jiuning Hu*, Min Ren, Lei Zhang, Ning Deng, Hao Dong and Peiyi Chen, “A Novel Boundary Approach for Spin Polarized Transport in Pseudo-Spin-Valve Structure” (**refereed contributed talk**), The 7th IEEE International Conference on Nanotechnology, Hong Kong (08/03/2007)

- Lei Zhang, Hao Dong, Ning Deng, Min Ren, Jiu-Ning Hu* and Pei-Yi Chen, “Spin-polarized Thermionic Emission at the Interface of Ferromagnetic Metal and Organic Semiconductor” (**refereed contributed talk**), The 7th IEEE International Conference on Nanotechnology, Hong Kong (08/03/2007)
- Jiuning Hu, Min Ren*, Lei Zhang, Ning Deng, Hao Dong and Peiyi Chen, “Effects of FM/NM Interfaces on Spin Accumulation in Free Layer of Pseudo-Spin-Valve Structure” (**refereed contributed talk**), 2007 MRS Spring Meeting, San Francisco, CA (04/10/2007)
- Min Ren*, Lei Zhang, Jiuning Hu, Ning Deng, Dong Hao and Peiyi Chen, “Nonlinear Damping Generated by Spin Injection in a Pseudo-spin-valve Structure” (**refereed contributed talk**), 2007 MRS Spring Meeting, San Francisco, CA (04/10/2007)

- REFEREE SERVICE
- *ACS Nano*
 - Physics Letters A
 - Applied Physics Letters
 - Nanoscale
 - Materials Chemistry and Physics
 - Chemical Physics Letters

TECHNICAL SKILLS Cleanroom Experiences:

- VB6 ebeam lithography
- Thermal and ebeam evaporation
- Atomic Force Microscopy
- Optical Lithography
- Alpha Step IQ
- Axic PECVD
- Profilometer

Field Engineer Experiences:

- Variable Temperature Inserts
- Helium-3 superconducting magnet systems
- Probe-station
- Raman spectroscopy
- Wire bonding
- Raith ebeam lithography
- Machine shop skills: Lathe, Milling, Drill press, Band saw, Belt Sander/Grinder, Files

Programming: C, Fortran, Assembly Language, MATLAB, Hspice

Computer Applications: T_EX (L^AT_EX, B_IB_TE_X), most common productivity packages

Computer-Aided Design: Cadence OrCAD, SPICE, VHDL, LabVIEW

- MEMBERSHIPS
- Semiconductor Research Corporation (SRC), Student Member
 - American Physical Society (APS), Student Member
 - IEEE, Student Member
 - Red Cross Society of China, Member
 - Tsinghua Aircraft Model Association, Member

MISCELLANEOUS ACTIVITIES

- Commissary Member of Class W27 in Charge of Class Organization, Tsinghua University, 2004–2005
- Accomplished the 2004 ANA Beijing International Marathon, October 2004

- Social Investigation on People's Living Standard in Three-Gorge Region, China, June 2004–July 2004
- Field Survival Training, Baihua Mountain, China, March 2004
- Summer Practice in Huawei's Beijing Research Center, Beijing, China, July 2003

REFERENCES

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