

Giri Joshi

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EDUCATION

Boston College, Chestnut Hill, MA, USA

Ph. D. in Physics, graduated in 2010

Advisor: Zhifeng Ren (<https://mysm.uh.edu/wiki/projects/drrengroup/>)

Tribhuvan University, Kirtipur, Nepal

M. S. in Physics, 2002

Mahendra Morang Campus, Tribhuvan University, Nepal

B. S. in Science, Major in Physics, Chemistry & Mathematics, 2000

TEACHING EXPERIENCE

2008-2018: Mentored undergraduates Interns, supervised undergraduate and graduate students for research projects at Boston College, GMZ Energy, Evident Thermoelectrics and Nanohmics, Inc.

2006-2008: Teaching assistance (TA) at Boston College; Homework grading, office hours, taught undergraduate physics lab courses.

2002-2005: Lecturer at Tribhuvan University and Central Institute of Technology, Kathmandu Nepal; taught master and bachelor level courses (solid state physics, classical mechanics, modern physics, University Physics).

AWARD

- Awarded by Nepal Bidhya Bhusan and Chhatra Prasad Mainali Gold Medal for Ranking first in the class of M. Sc. in Physics 2002 of Tribhuvan University, Nepal, and got a chance to teach physics courses of M. Sc students of Central Department of physics, Tribhuvan University, Nepal.

RESEARCH EXPERIENCE

Senior Materials Scientist

March 2017 – Current

Nanohmics Inc., Austin TX

- Serving as Principal Investigator for DOD SBIR Phase I and managing NASA SBIR Phase II program to develop conformal thermoelectric modules.
- Experienced on proposal writing on DOD, NSF, DOE and NIH SBIR Program and DOE BAA based on thermoelectric technology and magnetic materials applications.
- Fabricated thin film magnetic materials using Sputtering/EVM and characterized using Vibrating Sample Measurement (VSM), XRD, XPS for Scanning Probe Technology.
- Designed, fabricated and characterized fiberglass-supported thermoelectric power generator and cooler.
- Microstructure fabrication (Lithography/DRIE) for optical applications (CubeSat).

Materials Engineer/Director, Materials R&D

June 2016 – February 2017

Sheetak Inc., Austin TX

- Fabricated best nanostructured BiTe, SiGe and half-Heusler using metallurgy, ball milling, and SPS technologies.

- Developed contact on semiconductors using sputtering, electroplating, photolithography and SPS techniques, assembled devices and reliability of modules.
- Collaborating with Universities and Industries for different R&D projects.

Manager/Scientist, Materials R&D

September 2010 – February 2016

Evident/GMZ Energy Inc., Waltham, MA

- Developed an efficient half-Heusler materials and modules for power generation applications using nanotechnology (Melting, ball milling, SPS, thin film deposition, CMP).
- Conducted metallurgical research on different nanostructured thermoelectric materials such as half-Heuslers, Skutterudites, Bismuth Tellurides to optimize efficiency, thermal stability and mechanical properties, thin film metal deposition using PVD techniques and photolithography.
- Established experimental design and standard operation procedures (SOP) for nanotech based material fabrication, characterization tools, quality control protocol of the materials, involved in data analysis and interpretation, and managed quality control of a product.
- Collaborated research work with different Universities and Industries under high profile government grants such as DoE (\$11M), TARDEC (\$2M), DARPA (\$4M) etc., and fabricated 1kW TEG using half-Heusler modules.
- Developed new material fabrication process and compositions, identified patentable results, drafted for patent filing and journals publications and attended conferences for new ideas.

Graduate Research Assistant

June 2007 – November 2009

Department of Physics, Boston College

- Developed efficient thermoelectric materials (BiTe, SiGe, half-Heuslers, BiSb) in different projects funded by NASA, NSF, DOE.
- Handled advanced instruments such as TEM, SEM, XRD, ZEM-3, Laser Flash systems, DSC, Hall measurement system are successfully during the research.
- Performed contact metallization, device fabrication. Sputtering, Ion milling, Electro less plating techniques, thermal evaporation.
- Supervised undergraduate students to fabricate nanostructured thermoelectric materials.
- Published the research work in different journals.

PATENTS

- Co-inventor of US Patent application 16/048337 titled “Flexible and Conformable Thermoelectric compositions”.
- Co-inventor of US Patent 2015/9048004 A1 titled “New manufacturing method for half-Heusler alloys to produce material with enhanced figure-of-merit and improved thermoelectric properties”.
- Co-inventor of US Patent 2014/8865995 B2 titled “Methods for high figure-of-merit in nanostructured thermoelectric materials”.
- Co-inventor of US Application 61/969344 titled “NbFeSb based half-Heuslers for power generation application and method of making”.
- Co-inventor of US Published Application 2014/058988 A1 titled “Hot pressed metallization on bismuth telluride and half-Heuslers and method of making”.
- Co-inventor of US Published Application 2012/0326097 A1 titled “Half-Heusler alloys with enhanced figure-of-merit and method of making”.

ATTENDED CONFERENCES AND PRESENTATION

- ICT 2018, “Fiberglass supported thermoelectric modules for power generation applications”, Caen, France.
- ICT 2017, “Fiberglass supported thermoelectric modules for power generation applications”, Pasadena, USA.
- ICT 2015, “Nanostructured half-Heuslers modules for power generation applications”, Dresden, Germany.
- **Invited talk on “Efficient high temperature thermoelectric materials: Half-Heuslers for power generation applications” at DAE-SSPS-2014, Vellore, Tamilnadu, India.**

- ICT 2014, “Low cost half_Heusler devices for power generation applications”, Nashville, TN, USA.
- ICT 2012, “Enhancement of thermoelectric figure-of-merit of nanostructured half-Heuslers and applications”, Alborg, Denmark
- ICT 2011, “Enhancement of thermoelectric figure-of-merit of nanostructured n- type half-Heuslers”, Michigan, USA
- APS 2009, “Enhancement of thermoelectric figure-of-merit of nanostructured Silicon Germanium”, Pittsburgh, PA.
- APS 2008, “Enhancement of thermoelectric figure-of-merit of nanostructured Silicon Germanium”, New Orleans, LA.

SELECTED MEDIA COVERAGES

1. “GMZ Energy announces new thermoelectric material” by Business Wire on 14 October 2014 (<http://www.businesswire.com/news/home/20141014005952/en>).
2. “Nanotechnology boost thermoelectric performance” by Compound Semiconductor on 19 January 2011 (<http://www.compoundsemiconductor.net/article/87519-nanotechnology-boosts-thermoelectric-performance.html>).
3. “Enhanced thermoelectric capability in silicon germanium bulk alloys” by Green Car Congress on 31 October 2008 (<http://www.greencarcongress.com/2008/10/enhanced-thermo.html>).

PROFESSIONAL SERVICES

- Peer reviewed scientific papers for various journals such as Advanced Functional Materials, Advanced Energy Materials, Journal of Chemistry and Solids etc.
- Member of Nepal Physical Society since 2004.
- Member of Material Research Society in 2007.
- Member of American Physics Society since 2008.
- Member of International Thermoelectric Society since 2011

CITATIONS (GOOGLE SCHOLAR, UPDATED: 12/20/2016)

List of publications and citations:

	All	Since 2013
<u>Citations</u>	3584	2870
<u>h-index</u>	20	19
<u>i10-index</u>	23	22

<https://scholar.google.com/citations?user=vRdcO3wAAAAJ&hl=en>

PUBLICATIONS

Book Chapter

1. **Giri Joshi**, Yucheng Lan and Zhifeng Ren, “*Half-Heusler Modules*”, **Chapter 19, Advanced Thermoelectrics: Materials, Contacts, Devices and Systems**, edited by Zhifeng Ren, Yucheng Lan and Qinyong Zhang, 2017.

Journal articles

1. **Giri Joshi**, Dan Mitchell, Josh Ruedin, Kyle Hoover, Rey Guzman, Mike McAleer, Leslie Wood, and Steve Savoy, *Pulse light surface annealing for low contact resistance interfaces between metal electrode and bismuth telluride thermoelectric materials*, **Journal of materials Chemistry C**, In Press 2018.

2. **G. Joshi**, Bed Poudel, *Efficient and robust thermoelectric power generation device using hot pressed metal contact on nanostructured half-Heusler alloys*, **Journal of Electronic Materials**, pp 1-5, 2016. DOI: 10.1007/s116604-016-4692-1.
3. S. Pandey, **G. Joshi**, S. Wang, S. Curtarolo, and R. Gaume, *Thermoelectric characterization of fine-grained Ti5O9 Magneli phase ceramics*, **Journal of Electronic Materials**, 2016. DOI: 10.1007/s11664-016-4762-4.
4. Ashwin Rao, Pawan Banjade, Gregg Bosak, Binay Joshi, Jennifer Keane, Luke Nally, Adam Peng, Susanthri Perera, Alfred Waring, **Giri Joshi**, Bed Poudel, *A quick and efficient measurement technique for performance evaluation of thermoelectric materials*, **Measurement Science and Technology**, **27** (2016), 105008. DOI: 10.1088/0957-0233/27/10/105008
5. W. Wong-Ng, J. W. Lynn, Q. Huang, C. M. Brown, J. A. Kaduk, and **G. Joshi**, *Observation of drastic change of generalized phonon density-of-states in nanostructured half-Heusler using inelastic neutron scattering*, **Appl. Phys. Lett.** **107**, 2013901 (2015).
6. Y. Zhang, M. Cleary, X. Wang, N. Kempf, L. Schoensee, J. Yang, **G. Joshi**, L. Meda, *High temperature and high power density nanostructured thermoelectric generator for automotive waste heat recovery*, **Energy Conversion & Management** **105**, 946 (2015).
7. H. Wang, S. Bai, L. D. Chen, A. Cuenat, **G. Joshi**, H. Kleinke et al., *International round-robin study of thermoelectric transport properties of an n-type half-Heusler compound from 300K to 773K*, **J. of Electronic Materials** **44**, 4482 (2015).
8. **Giri Joshi**, Ran He, Michael Engber, Georgy Samsonidze, Tej Pantha, Ekraj Dahal, Keshab Dahal, Jian Yang, Yucheng Lan, Boris Kozinsky, and Z. F. Ren, *NbFeSb- based p-type half-Heuslers for power generation applications*, *Energy and Environmental Science* **7**, 4070 (2014).
9. Tulashi Dahal, Qing Jie, **Giri Joshi**, Shuo Chen, Chuanfei Gao, Yucheng Lan, and Zhifeng Ren, *Thermoelectric property enhancement in Yb-doped n-type Skutterudites Yb_xCo₄Sb₁₂*, *Acta Materialia* **75**, 321 (2014).
10. **Giri Joshi**, Tulashi Dahal, Shuo Chen, Hengzhi Wang, Junichiro Shiomi, Gang Chen, and Z. F. Ren, *Enhancement of thermoelectric figure-of-merit at low temperatures by titanium substitution of hafnium in n-type half-Heusler Hf_{0.75-x}Ti_xZr_{0.25}NiSn_{0.99}Sb_{0.01}*, **Nano Energy** **2**, 82 (2013).
11. Gauhua Zhu, Weishu Liu, Yucheng Lan, **G. Joshi**, Hui Wang, G. Chen, and Zhifeng Ren, *The effect of secondary phase on thermoelectric properties of Zn₄Sb₃ compound*, **Nano energy**, Available online (2013).
12. Weishu Liu, Hengzhi Wang, Lijuan Wang¹, Xiaowei Wang³, **Giri Joshi**, Gang Chen, and Zhifeng Ren, *Understanding of the contact of nanostructured thermoelectric n-type Bi₂Te_{2.7}Se_{0.3} legs for power generation applications*, **J. of Mater. Chem.** **A1**, 13093 (2013).
13. Kevin Lukas, **Giri Joshi**, K. Modic, Zhifeng Ren, and Cyril Opeil, *Thermoelectric properties of Ho-doped Bi_{0.88}Sb_{0.12}*, **Journal of Material Sciences** **47**, 5729 (2012).
14. Kevin Lukas, Weishu Liu, **Giri Joshi**, Mona Jabarjadi, Mille S. Dresselhaus, Zhifeng Ren, Gang Chen and Cyril Opeil, *Experimental determination of Lorentz number in Cu_{0.01}Bi₂Te_{2.7}Se_{0.3} and Bi_{0.88}Sb_{0.12}*, **Physical Review B** **85**, 205410 (2012).
15. Ted Wangenstein, Marek Merlak, Tara Dhakal, Pritish Mukherjee, Sarath Witanachchi, Bed Poudel, and **Giri Joshi**, *Growth of nanoparticulate films of Ca₃Co₄O₉ by a microwave plasma-assisted spray process*, **Journal of Materials Research** **26**, 1940 (2012).
16. **Giri Joshi**, Xiao Yan, Hengzhi Wang, W. S. Liu, Gang Chen, and Z. F. Ren, *Enhancement in thermoelectric figure-of-merit of n-type half-Heusler compound by nanocomposite approach*, **Advanced Energy Materials** **1**, 643 (2011).
17. Xiao Yan, **Giri Joshi**, Weishu Liu, Yucheng Lan, Xiaowei Wang, Bed Poudel, Jack William Simonson, Joseph Poon, Hui Wang, Gang Chen, Z. F. Ren, *Enhanced Thermoelectric Figure-of-Merit of p-Type Half-Heuslers*, **Nanoletters** **11**, 556 (2011).
18. M. Zebbarjadi, **G. Joshi**, G. H. Zhu, B. Yu, A. Minnich, Y. C. Lan, X. W. Wang, M. S. Dresselhaus, Z. F. Ren, and G. Chen, *Power factor enhancement by modulation-doping in bulk nanocomposites*, **Nanoletters** **11**, 2225 (2011).
19. G. H. Zhu, Y. C. Lan, H. Wang, **G. Joshi**, Q. Hao, G. Chen, and Z. F. Ren, *Effect of selenium deficiency on the thermoelectric properties of n-type In₄Se_{3-x} compounds*, **Phys. Rev. B** **83**, 115201 (2011).

20. Qing Hao, Gaohua Zhu, **Giri Joshi**, Xiaowei Wang, Austin Minnich, Zhifeng Ren, and Gang Chen, *Theoretical studies on the Thermoelectric Figure-of-Merit of Nanograined Bulk Silicon*, **Applied Physics Letters** **97**, 063109 (2010).
21. Xiao Yan, Bed Poudel, Yi Ma, Weishu Liu, **Giri Joshi**, Hui Wang, Yucheng Lan, Dezhi Wang, Gang Chen, and Z. F. Ren, Experimental Studies on Anisotropic Thermoelectric Properties and Structures of n-Type Bi₂Te_{2.7}Se_{0.3}, *Nanoletters* **10**, 3373 (2010).
22. A. J. Minnich, H. Lee, X. W. Wang, **G. Joshi**, M. S. Dresselhaus, Z. F. Ren, G. Chen and D. Vashaee, Modeling studies of thermoelectric SiGe nanocomposites, *Physical Review B* **80**, 155327 (2009).
23. Gaohua Zhu, Hohyun Lee, Yucheng Lan, Xiaowei Wang, **Giri Joshi**, Dezhi Wang, Jian Yang, Daryoosh Vashaee, Hannah Guilbert, Abigail Pillitteri, Mildred S. Dresselhaus, Gang Chen, and Zhifeng Ren, *Increased Phonon Scattering by Nanograins and Point Defects in Nanostructured Silicon with a Low Concentration of Germanium*, **Physical Review Letters** **102**, 196803 (2009).
24. **Giri Joshi**, Hohyun Lee, Yucheng Lan, Xiaowei Wang, Gaohua Zhu, Dezhi Wang, Ryan W. Gould, Diana C. Cuff, Ming Y. Tang, Mildred S. Dresselhaus, Gang Chen, and Zhifeng Ren, *Enhanced thermoelectric figure-of-merit in nanostructured p-type silicon germanium bulk alloys*, **Nanoletters** **8**, 4670 (2008).
25. Xiaowei Wang, Hohyun Lee, Yucheng Lan, Gaohua Zhu, **Giri Joshi**, Dezhi Wang, Jian Yang, Andrew J. Muto, Ming Y. Tang, Jeffrey Klatsky, Shengye Song, Mildred Dresselhaus, Gang Chen, and Zhifeng Ren, High thermoelectric figure-of-merit in nanostructured n-type silicon germanium bulk alloy, **Applied Physics Letters** **93**, 193121 (2008).
26. Qinyu He, Qing Hao, Xiaowei Wang, Jian Yang, Yucheng Lan, Xiao Yan, Bo Yu, Yi Ma, Bed Poudel, **Giri Joshi**, Dezhi Wang, Gang Chen, and Zhifeng Ren, *Nanostructured Thermoelectric Skutterudite Co_{1-x}Ni_xSb₃ Alloys*, **Journal of Nanoscience and Nanotechnology** **8**, 4003 (2008).
27. M. S. Dresselhaus, G. Chen, Z. F. Ren, J. P. Fleuroal, P. Gogna, M. Y. Tang, D. Vashaee, H. Lee, X. W. Wang, **G. Joshi**, G. Zhu, D. Z. Wang, R. Blair, S. Bux, and R. Kaner, **Mater. Res. Soc. Symp. Proc.** **1044**, 29 (2008).
28. Hohyun Lee, Daryoosh Vashaee, Xiaowei Wang, **Giri Joshi**, Gaohua Zhu, Dezhi Wang, Zhifeng Ren, Sabah Bux, Richard Blair, Pawan Gogna, Jean-Pierre Fleurial, Ming Y. Tang, Mildred S. Dresselhaus, and Gang Chen, *Thermoelectric Transport in Silicon Germanium Nanocomposites*, **IMECE**, 67436 (2008).

Journal articles in preparation

29. **Giri Joshi**, Andrew Foley, David Silva, and Chris Mann, *Multilayer permalloy – titanium deposition to fabricate low coercivity magnetic materials*, 2018.
30. **Giri Joshi**, Andrew Foley, and Chris Mann, *Fabrication and characterization of Terfenol-D and Galfenol for magnetostrictive applications*, 2018.