**Qing Zhu**

**SUMMARY**

* Strong materials science background: 5 years' experience in semiconductor (thermoelectric material) preparation and analysis. Particularly good at characterizing the electrical and thermal properties of the bulk materials.
* A solid background in Mechanical Engineering, especially proficient in engineering software like COMSOL Multiphysics, LabVIEW, ANSYS.
* Efficiently managed projects that led to 10+ publications, 300+ citations, 1 book chapter.

**EXPERIENCE**

**Postdoc**

Department of Mechanical Engineering, Rice University, Houston, TX **02/2020 - Present**

**Project**: Realizing thermal switching by magnetic materials

**Research Assistant 08/2014 - 02/2020**

Materials Science and Engineering program, **University of Houston**. Houston, TX

**Project**: Characterization of Thermoelectric Materials: From Properties to Efficiencies

* Discovered the best dopant to improve the performance of semiconductor (thermoelectric material). Implemented ball milling and hot-press technique to prepare the thermoelectric material, and measured the Seebeck coefficient, electrical conductivity, thermal conductivity by ZEM-3, laser flash, PPMS.
* Coating techniques like sputtering, electroplating techniques, and hot-press were employed to form Nickle, gold layers on the surface of thermoelectric material. SEM, TEM techniques were adopted to further characterize the microstructure of the layers.
* Measured an ultrahigh conversion efficiency of 10.6% of thermoelectric material (Mg3.1Co0.1Sb1.5Bi0.49Te0.01) by the homemade device.
* Designed a homemade efficiency-measurement system which required to build a homemade vacuum system to have the measurement conducted at low air pressure, and write a LabVIEW program to control the Keithley devices, record the temperatures from thermocouples and voltages, currents from the Keithley devices. Other components like PID control, load pressure sensor were incorporated into the program.
* Extensive data analysis from electrical, thermal conductivity data and finite difference modeling according to the standard model using MATLAB and Python.
* Used COMSOL Multiphysics to simulate the temperature, electrical potential distribution, output power, and conversion efficiency of three-dimensional thermoelectric materials.

**Research Assistant 09/2012- 06/2014**

School of Materials Science and Engineering, **Northwestern Polytechnical University**, Xi’an, China

**Project:** A gradient LAMS (Li2O-MgO-Al2O3-SiO2) interlayer joint of SiC coated C/C (carbon/carbon) composites to LAS (Li2O-MgO-SiO2) glass ceramics

* Used sintering, annealing techniques to prepare nanosized LAMS powders.
* Grew Silicon Carbide nanowires (SiC NWS) by Chemical Vapor Deposition (CVD to enhance the bonding strength of LAS and C/C composite by NWS, and designed a gradient interface to release the stress between LAS and C/C composite.
* Conducted the failure test of materials.

**EDUCATION**

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| **Ph.D.** | Aug/2014 to May/2019 | Materials Science and Engineering **University of Houston**, Houston, TX.  |
| **B.S.** | Sep/2009 to Jun/2013 | Materials Science and Engineering **Northwestern Polytechnical University**, Xi’an, China.  |

**TEACHING AND MENTORING EXPERIENCE**

* Teaching Assistant for Digital Electronics **2014 Fall and 2015 Fall**
* Teaching Assistant for Electronics Laboratory **2015 Spring**
* Teaching Assistant for Power Transmission and Distribution **2016 Spring**

**RELEVANT COURSEWORK**

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| Material Science of Thin Films | Methods of Applied Mathematics | Physical Metallurgy |
| Nanomaterials Engineering | Optoelectronics and Photonics: Principles and Applications | Experimental Methods in Chemical Engineering |

**HONORS AND COMMUNITY SERVICE**

* Scholarship for undergraduate student Northwestern Polytechnical University **2009-2013**

**SKILLS**

* Tools & Technologies: Microsoft Word, PowerPoint, Excel, Origin, COMSOL Multiphysics, AutoCAD.
* Programming Language: MATLAB, LabVIEW and Python.
* Other Skills: XRD, EDS, CVD, Sputtering.

**PUBLICATIONS**

* **Q. Zhu**, H.S. Kim, Z.F. Ren. A rapid method to extract Seebeck coefficient under a large temperature difference. Rev Sci Instrum. 88 (2017).
* **Q. Zhu**, S.S. Song, H.T. Zhu Z.F. Ren. Realizing high conversion efficiency of Mg3Sb2-based thermoelectric materials. J. Power Sources. 44 (2019) 393-400.
* **Q. Zhu**, Z.F. Ren. A Double Four-Point Probe Method for Reliable Measurement of Energy Conversion Efficiency of Thermoelectric Materials. Energy.191 (2019): 116599
* **Q. Zhu**, Z.F. Ren. Reliable characterization of the performance of Thermoelectric Materials. Materials Today Physics. Under review.
* J. Mao, Y.X. Wu, S.W. Song, **Q. Zhu**, J. Shuai, Z.H. Liu, et al. Defect Engineering for Realizing High Thermoelectric Performance in n-Type Mg3Sb2-Based Materials. Acs Energy Lett. 2 (2017) 2245-50.
* H.Q. Zhou, F. Yu, **Q. Zhu**, J.Y. Sun, F. Qin, L. Yu, et al. Water splitting by electrolysis at high current densities under 1.6 volts. Energ Environ Sci. 11 (2018) 2858-64.
* Q. Zhang, Q.C. Song, X.Y. Wang, J.Y. Sun, **Q. Zhu**, K. Dahal, et al. Deep defect level engineering: a strategy of optimizing the carrier concentration for high thermoelectric performance. Energ Environ Sci. 11 (2018) 933-40.
* H.T. Zhu, R. He, J. Mao, **Q. Zhu**, C.H. Li, J.F. Sun, et al. Discovery of ZrCoBi based half Heuslers with high thermoelectric conversion efficiency. Nat Commun. 9 (2018).
* J. Shuai, J. Mao, S.W. Song, **Q. Zhu**, J.F. Sun, Y.M. Wang, et al. Tuning the carrier scattering mechanism to effectively improve the thermoelectric properties. Energ Environ Sci. 10 (2017) 799-807.
* W.Y. Ren, H.T. Zhu, **Q. Zhu**, U. Saparamadu, R. He, Z.H. Liu, et al. Ultrahigh Power Factor in Thermoelectric System Nb0.95M0.05FeSb (M = Hf, Zr, and Ti). Adv Sci. 5 (2018).
* Z.S. Ren, J. Shuai, J. Mao, **Q. Zhu**, S.W. Song, Y.Z. Ni, et al. Significantly enhanced thermoelectric properties of p-type Mg3Sb2 via co-doping of Na and Zn. Acta Mater. 143 (2018) 265-71.