

## Ying Zhong, Ph.D.

Department of Mechanical Engineering, University of South Florida

Address: 4202 E. Fowler Avenue, Tampa, FL 33620, USA

Email: [yingzhong@usf.edu](mailto:yingzhong@usf.edu); Tel: +1 (858)-263-6576

Website: [www.usfgreen.com](http://www.usfgreen.com)

### WORK EXPERIENCE

**Assistant Professor**, University of South Florida, Tampa, USA 08/2019-Present  
Department of Mechanical Engineering

**Postdoctoral Research Scholar**, University of California, San Diego, USA 11/2017-07/2019  
Advisor: Prof. Yu Qiao, Department of Structural Engineering

### EDUCATION

**Ph.D.**, Materials Science and Engineering, University of California, San Diego, USA 06/2017  
Dissertation: “*Surface Voltages Control of Polymer Films Electrified through Corona Charging and Contact Electrification*”  
Advisor: Prof. Yu Qiao, GPA: 4.00/4.00

**Ph.D.**, Materials Processing Engineering, Harbin Institute of Technology, China 10/2017  
Dissertation: “*Low Temperature Sintering Cu<sub>6</sub>Sn<sub>5</sub> Nanoparticles for Advanced Flexible IC Interconnects*”  
Advisor: Prof. Chunqing Wang, GPA: 4.00/4.00

**M.E.**, State Key Laboratory of Advanced Welding & Joining, Harbin Institute of Technology, China 07/2012  
Thesis: “*Microstructure and Reliability Revolution of Interconnects in high-power and flexible electronics*”  
Advisor: Prof. Chunqing Wang, GPA: 3.60/4.00 (**Highest** score in the class)

**B.E.**, Electronic Packaging Technology, Harbin Institute of Technology, China 07/2010  
Thesis: “*Diamond/SAC Composite Solder with enhanced thermal conductivity for high-power devices*”  
Advisor: Dr. Wei Zhang, GPA: 3.70/4.00 (**Highest** score in the major)

### RESEARCH EXPERIENCE

#### 1. Better than Air: Solid-Air Multilayer for Thermal Insulation

*University of California, San Diego* 2014-2019

- Invented low cost and resilient ultra-thermal insulation technology based on solid-air multilayer structure
- Achieved better-than-air robust thermal insulation with free-standing and nano-patterned nanofilms based meta-structure
- Initiated the idea of utilizing electrical repulsion force to suspend thousands of layers of nanofilms
- Conducted kinds of thermal transfer, mechanical, optical measurements
- Realized precise surface potential control of dielectric materials; manufactured triboelectrification based energy harvesters

#### 2. Advanced Packaging Technology for Harsh Environment and Flexible Electronics

*Graduate Research Assistant, Harbin Institute of Technology, China* 2012-2019

- Played a key role in idea generation, proposal preparation, research, and project management

- Invented the idea of utilizing  $\text{Cu}_6\text{Sn}_5$  nanoparticles to realize low temperature interconnection of high temperature survival 3<sup>rd</sup> generation electronics
- Realized phase transition induced nanocrystallization of bi-metallic at atomic level with in situ TEM, overcame the brittleness of the bulk by inverse Hall-Petch phenomenon, which is revolutionary in metallography
- Realized interconnect of SiC MOSFET devices with high conductance and reliability
- Developed universal solder for interconnection and packaging of optical devices for NASA

### 3. Ultra-Fast R2R Printing of Highly-Sensitive Skin-Like Multifunctional Flexible Sensors

*University of California, San Diego*

2017-2019

- Initiated the idea, founded the team constructed by researchers from different areas
- Developed ultra-fast R2R mass production technology for flexible and high performance skin-like sensors
- Synthesized graphene, CNT, Ag NWs, thermal/light sensitive nanomaterials as sensing components
- Patterned various kinds of functional nanomaterials on the skin-like substrate for multi-functionalization
- Realized simultaneous monitoring of strain/stress, temperature, humidity, and light within one sensor
- Conducted human motion/health monitoring, skin-like sensing and ear-drum mimicking

### 4. In situ Manufacturing of High-performance Structural Components in Space and on Earth

*University of California, San Diego*

2014-2019

- Constructed the SOPO and work plan, optimized parameters for the project funded \$500,000 by ARPA-E
- Realized in situ additive manufacturing of ultra-strong Martian bricks without utilizing artificial additives
- Manufactured ultralow-binder-content high-performance Lunar cement through additive manufacturing
- Transferred the in situ space manufacturing concept back on earth and developed ultralow-binder-content green cement to reduce  $\text{CO}_2$  emission and construction energy consumption
- Initiated the idea of compositing wasted carbon into green cement to realize recycle and waste mitigation

### 5. Reversible and Adaptive Smart Textiles for Personalized Thermoregulation

*University of California, San Diego*

2013-2017

- Initiated the idea of using perspiration to control smart textiles; the concept was further pursued and funded \$2,600,000 by ARPA-E
- Overcame the problem of lack of sensitivity or reversibility of conventional temperature responsive materials
- Realized personalized thermoregulation by automatic and reversible human perspiration control
- Designed various smart 3D textile structures to adapt to different climate and reduce energy consumption
- Reduced the energy consumption of buildings

## TEACHING AND MENTORSHIP

- **Instructor, Department of Structural Engineering, UC San Diego**  
SE104/SE104L, Structural Materials and Lab for undergraduates (<http://mmrl.ucsd.edu/Courses/SE104/>)
- **Guest Instructor, Materials Science and Engineering Program, UC San Diego**  
MATS 251A, Processing of Polymers and Composites Course for graduate students
- **Teaching Assistant, Department of Structural Engineering, UC San Diego**  
SE104/SE104L, Structural Materials and Lab, Course management and teaching assistant for ~80 students
- **Team Leader, Volunteer Teaching Committee, Harbin Institute of Technology**  
Built up a team of more than 100 volunteers to teach scientific courses in high schools weekly
- **Founder, Technology Innovation Committee, Harbin Institute of Technology**  
Established this committee to support and mentor student teams aimed on technical innovation; Several teams won national grade technical innovation awards.

- **Team Leader, Volunteer Teaching Team, Linxi Middle School**  
Initiated quality development courses and science courses in middle school
- **Closely Mentored 2 Ph.D. students and 2 Master students in UCSD and HIT**  
Supervised first year graduate students in conducting research and project management

## **PUBLICATIONS**

---

### *Journal Articles*

1. Y Zhong, R An, H Ma, C Wang. Low-temperature-solderable intermetallic nanoparticles for 3D printable flexible electronics. **Acta Materialia**, 2019, 162: 163-175.
2. Y Zhong, R Kou, M Wang, Y Qiao. Synthesis of large-scale monolithic silicon carbide with well-defined nanopores and size effect of mechanical properties. **Journal of the European Ceramic Society**, 2019, 39 (7): 2566-2573.
3. R Kou, Y Zhong (co-first author), Y Qiao, Effects of anion size on flow electrification of polycarbonate and polyethylene terephthalate, **Applied Physics Letters**, 2019, 115, 073704.
4. Y Zhong, R Kou (co-first-author), M Wang, Y Qiao, electrification mechanism of corona charged organic electrets. **Journal of Physics D: Applied Physics**, 2019, 52, 44.
5. R Kou, Y Zhong (co-first-author), J Kim, M Wang, Q Wang, R Chen, Y Qiao. Elevating low-emissivity films for lower U-value. **Energy and Buildings**, 2019, 193:69-77.
6. H Su, T Chen, R Kou, M Wang, Y Zhong, Y Qiao, Y Hong. Fatigue behavior of inorganic-organic hybrid “Lunar Cement”, **Scientific Reports**, 2019, 9, 2238.
7. T Chen, B Chow, Y Zhong, M Wang, R Kou, Y Qiao. Formation of polymer micro-agglomerations in ultralow-binder-content composite based on lunar soil simulant. **Advances in Space Research**, 2018, 61 (3), 830-836.
8. M Wang, L Zhu, A Le, D Noelle, Y Shi, Y Zhong, F Hao, X Chen, Y Qiao. A multifunctional battery module design for electric vehicle. **Journal of Modern Transportation**, 2017, 25 (4): 218-222.
9. Y Zhong, F Zhang, M Wang, G Calvin, G Kim, Y Liu, J Leng, S Jin, R Chen. Reversible humidity sensitive clothing for personalized thermoregulation. **Scientific Reports**, 2017, 7: 44208.
10. B Chow, T Chen, Y Zhong, Y Qiao. Direct formation of structural components using a Martian soil simulant. **Scientific Reports**, 2017, 7(1).
11. C Zhao, Y Zhong, Y Qiao. Effects of porosity on dynamic indentation resistance of silica nanofoam, **Scientific Reports**, 2017, 7(1): 1060.
12. B Chow, T Chen, Y Zhong, M Wang, Y Qiao. Compaction of montmorillonite in ultra-dry state. **Advances in Space Research**, 2017, 60 (7), 1443-1452.
13. T Chen, B Chow, M Wang, Y Zhong, Y Qiao. High-pressure densification of composite Lunar cement. **Journal of Materials in Civil Engineering**, 2017, 29 (10), 06017013.
14. Y Zhong, W Liu, C Wang, X Zhao, J Caers. The influence of strengthening and recrystallization to the cracking behavior of Ni, Sb, Bi alloyed SnAgCu solder during thermal cycling. **Materials Science and Engineering: A**, 2016, 652: 264-270.

15. Y Zhong, R An, C Wang, Z Zheng, Z Liu, C Liu, C Li, T Kim, S Jin. Low temperature sintering Cu<sub>6</sub>Sn<sub>5</sub> nanoparticles for superplastic and super-uniform high temperature circuit interconnections. **Small**, 2015, 11(33), 4097-4103.
16. Y Zhong, W Zhang, C Wang, B Li. Manufacturing and microstructure of Cu coated diamonds/SnAgCu composite solder bumps. **Applied Mechanics and Materials**, 2013, 288: 323-327.
17. W Zhang, Y Zhong, C Wang. Effect of diamond additions on wettability and distribution of SnAgCu composite solder. **Journal of Materials Science and Technology**, 2012, 28(7): 661-665.
18. B Li, C Wang, Liu W, Y Zhong. Synthesis of Co-doped barium strontium titanite nanofibers by sol-gel/electrospinning process. **Materials Letters**, 2012, 75: 207-210.

### Conference Papers

19. Y Zhong, C Wang, X Zhao, J Caers. The influence of high melting point elements on the reliability of solder during thermal shock. The 65<sup>th</sup> Electronic Components and Technology Conference, 2015: 2162-2167.
20. Y Zhong, C Wang, J Caers, X Zhao. The evolution of IMCs' morphologies and types in SAC and SAC+ solder bumps during thermal shock process. The 14<sup>th</sup> Electronic Materials and Packaging, 2012: 1-4.
21. Y Zhong, W Zhang, C Wang, B Li. Preparation and microstructure of functionally gradient diamond/SAC composite solder bumps. The 12<sup>th</sup> Electronic Packaging Technology and High Density Packaging, 2011: 1-5. **(Best Paper Award)**
22. C Wang, Y Zhong, Caers J, X Zhao, B Li, B Liu. Relationship between crack propagation trends and grains in SnAgCu interconnects. The 13<sup>th</sup> Electronic Packaging Technology and High Density Packaging, 2012: 1200-1204.
23. B Li, C Wang, W Liu, Y Zhong, Z Zhang. Synthesis of multiferroic Ba<sub>0.7</sub>Sr<sub>0.3</sub>TiO<sub>3</sub>-based thin films for memory devices by chemical solution deposition. The 13<sup>th</sup> Electronic Packaging Technology and High Density Packaging, 2012: 12-14.
24. X Zhao, J Caers, S Noijen, Y Zhong, D Jong, H Gijsbers, G Elger, H Willwohl. Potential interconnect technologies for high power LEDs assemblies. The 4<sup>th</sup> Electronic System-Integration Technology Conference, 2012: 1-4. **(Best Paper Award)**

### PATENTS

1. Y Qiao, Y Zhong. Solid-gap multilayers for thermal insulation and management. US patent, WO2017197391A1, 2017.
2. S Jin, C Gardener, Y Zhong, G Kim, R Chen, C Choi, Y Kim. Adaptive smart textiles, method of producing them, and applications thereof, US patent, WO2017096044A1, 2017.
3. C Wang, Y Zhong, C Hang. Manufacturing Lead-free high temperature interconnections by sintering intermetallic nanoparticles at low temperature. CN102922071A, 2013.
4. C Wang, Y Zhong, C Hang. Intermetallic nanoparticle paste for Lead-free high temperature interconnections. CN102922177B, 2014.
5. J Leng, Y Liu, F Zhang, Y Zhong. A kind of humidity stimulated smart textile. ZL 20151005412.5, 2016.

## PRESENTATIONS

---

1. 12/2018 The Webinar of Engineering Science at “Materials for People” (**Invited**)
2. 12/2018 The 1<sup>st</sup> Youth Scientist Forum in Southern University of Science and Technology, China (**Invited**)
3. 12/2018 The 3<sup>rd</sup> Shenzhou Youth Scientist Forum in Harbin Institute of Technology, China (**Invited**)
4. 10/2018 The 51<sup>st</sup> International Symposium on Microelectronic, Pasadena, USA (**Best Student Award**)
5. 05/2018 The IEEE Electronic Components and Technology Conference, San Diego, USA
6. 03/2018 South China University of Technology, Guangzhou, China (**Invited**)
7. 12/2017 The Guanghua Youth Scientist Forum Fudan University, Shanghai, China (**Invited**)
8. 07/2017 The 18th IC on Electronic Packaging technology, Harbin, China
9. 02/2017 The 146th TMS Annual Meeting and Exhibition, San Diego, USA
- 10.05/2016 The 65th Electronic Components and Technology Conference, San Diego, USA
- 11.05/2016 The Socal’15 Technical Symposium, San Diego, USA (**Outstanding Student Award**)
- 12.10/2014 The 47th International Symposium on Microelectronics, San Diego, USA
- 13.07/2014 The 67th IIW Annual Assembly & International Conference, Seoul, Korea
- 14.04/2014 The 1st RF/Microwave Packaging Workshop, San Diego, USA (**Outstanding Student Award**)
- 15.02/2014 TMS 2014 143rd Annual Meeting and Exhibition, San Diego, USA
- 16.12/2012 The 14th IC on Electronic Materials and Packaging, Hong Kong, China
- 17.08/2012 The 13th IC on Electronic Packaging Tech, Guilin, China (**Keynote & Best Student Paper**)

## AWARDS & HONORS

---

<b>Top ten</b> excellent students of Harbin Institute of Technology	2009
<b>National scholarship</b> for twice (One of the best student award in China)	2016, 2009
Outstanding thesis for twice	2012, 2010
First-Class scholarship seven times	2006-2012
Excellent volunteer of social practice for six times	2006-2012
Excellent youth league of Harbin Institute of Technology for four times	2006-2013
Excellent graduate of the Province for twice	2010, 2012
Merit student of Harbin Institute of Technology	2008