

# **Xiangjia (Cindy) Li, PH.D.**

## *Curriculum Vitae*

School for Engineering of Matter, Transport and Energy  
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(Last Updated: January 2020)

### ***Education***

<b>Ph.D.</b> 08/14 - 08/19	<b>University of Southern California, Los Angeles, CA</b> Major: Industrial and Systems Engineering Core field: Additive Manufacturing Dissertation: Multi-scale biomimetic structure fabrication based on immersed surface accumulation Dissertation Advisor: Yong Chen
<b>M.S.</b> 08/17 - 05/19	<b>University of Southern California, Los Angeles, CA</b> Major: Computer Science
<b>M.E.</b> 09/11 - 04/14	<b>Nanjing University of Aeronautics and Astronautics, China</b> Major: Manufacturing Engineering of Aeronautics and Astronautics
<b>B.E.</b> 09/07 - 06/11	<b>Nanjing University of Aeronautics and Astronautics, China</b> Major: Mechanical Engineering and Automation

### ***Professional Experience***

01/20 - present	<u>Assistant Professor</u> , Tempe, AZ Arizona State University
09/19 - 12/19	<u>Postdoctoral Research Associate</u> , Los Angeles, CA University of Southern California
08/14 - 06/19	<u>Doctoral Research Assistant</u> , Los Angeles, CA University of Southern California

03/14 - 05/14	<u>CAD &amp; CAM Lecturer</u> , Nanjing, China Engineering Training Center Nanjing University of Aeronautics and Astronautics
03/14 - 09/11	<u>Graduate Research Assistant</u> , Nanjing, China Department of Mechanical & Electrical Engineering Nanjing University of Aeronautics and Astronautics
04/12 - 09/08	<u>Undergraduate Student Advisor Assistant</u> , Nanjing, China Department of Mechanical & Electrical Engineering Nanjing University of Aeronautics and Astronautics

### ***Awards and Honors***

04/19	<u>USC Annual ISE Research Festival 1<sup>st</sup> Best Presentation Award</u>
04/18	<u>USC Stevens Center for Innovation Commercialization Award</u>
03/17	<u>USC ISE Open House 2<sup>nd</sup> Best Poster Award</u>
03/16, 08/16, 08/17, 04/18	<u>National Science Foundation (NSF) Student Travel Award</u>
12/13	<u>National Graduate Student Scholarship</u> , China
09/10	<u>LG Display Corporation Scholarship</u> , China

## **RESEARCH**

### ***Research Interests***

- *Additive manufacturing processes development: ultra fast one-step 3D printing, multi-scale nanocomposite printing and multi-material 3D printing*
- *Design, modeling, and optimization of biomimetic structures and materials*
- *Biomedical application of advanced manufacturing for healthcare*

### ***Research Experience***

08/19 – 12/19	<u>Postdoctoral Research Associate - USC</u>
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**Magnetic field assisted 3D printing for anisotropic nanocomposite fabrication**

- *3D Printing Painless Microneedle by Magnetic Field assisted Stereolithography*

Limpet teeth inspired painless microneedle with enhancing mechanical performance was built by magnetic field-assisted three-dimensional (3D) printing process.

## **Micro fluid assisted additive manufacturing of multi-material and multi-functional structures**

- *Microscale Droplet Manipulation based Liquid Rolling Printing*

This liquid rolling printing method, utilizing the bionic wetting structure's capability of droplet manipulation, was developed and demonstrated attractive advantages in terms of support-less fabrication of micro and mesoscale structures with multi-materials and multi-functions.

08/14 - 06/19

Research Assistant at University of Southern California

## **Multi-scale additive manufacturing process development**

- *Ultra-fast Layer-less 3D Printing with Continuous Liquid Flow*

An ultra-fast continuous 3D printing process featuring 5-10x faster speed than other mask image projection based SLA process and 100 x faster speed than the laser-based SLA process.

- *Multi-scale & Multi-material 3D Hierarchical Printing*

A novel 3D hierarchical printing technology that can be applied to fabricate bio-mimic functional multi-scale hierarchical functional structures ranging from macro-scale to Nano-scale.

- *Immersive Surface Accumulation (ISA) Printing*

A 3D printing process with the capability to build high-resolution 3D micro-scale features on complex free-form surfaces of macro-scale component, achieving the cutting-edge performance of 8  $\mu\text{m}$  fabrication capability.

## **Additive manufacturing of biomimetic material and structures**

- *3D Printing Cactus inspired Spines for Water Collection*

Multi-scale artificial structures inspired by *Cactus* spines for highly efficient water collection was design and fabricated by the Immersed surface accumulation (ISA) printing process.

- *3D Printing Salvinia Molesta inspired Superhydrophobic Structure for Microdroplet Manipulation*

Superhydrophobic micro-scale artificial hairs with eggbeater heads inspired by *Salvinia molesta* leaf was designed and fabricated by the Immersed surface accumulation (ISA) printing process, revealing the potential applications in biomedical engineering and environmental engineering, such as droplet based bio-reactor, oil/water separation.

Featured on USC news: [news.usc.edu](http://news.usc.edu) and [Viterbischool.usc.edu](http://Viterbischool.usc.edu)

Featured News Article: [NSFNews](#), [EurkAlert by AAAS](#), [Phys.Org](#), [3Dprintingindustry](#), [Fondriest](#),

etc.

- ***3D Printing Hair inspired Flexible Liquid Sensor based on Swelling of Hydrogel***

3D printing of bio-inspired liquid sensor with the capability of detecting the position and direction of liquid leakage.

08/14 - 06/19

Research Assistant at Alfred E. Mann Institute - USC

## **Bio-printing of medical devices for healthcare**

- ***3D Printing of Biodegradable Scaffold for Craniofacial and Long Bone Regeneration***

Provide a comprehensive solution of design, material selection and additive manufacturing of biodegradable scaffold for craniofacial and long bone regeneration.

- ***3D Printing Temporary Restoration within Minutes for Chairsides in Dental Office***

Investigation of a novel 3D printing technology specifically for a focused dental market – temporary restoration, with emphasis on system prototyping, process optimization, FDA-approved dental materials investigation, and fabrication characteristics study.

## ***Publications***

### *Journal Articles:*

1. **Xingjian Li**, Yuan Yuan, Luyang Liu, Yuenshan Leung, Yiyu Chen, Yuxing Guo, Yang Chai, Yong Chen, “3D Printing of Hydroxyapatite/Tricalcium Phosphate (HA/TCP) Scaffold with Hierarchical Porous Structure for Bone Regeneration.” *Bio-Design and Manufacturing*, (2019) pp1-15
2. **Xiangjia Li**, Yang Yang, Luyang Liu, Yiyu Chen, Ming Chu, Haofan Sun, Yong Chen, "3D Printed Cactus-inspired Spine Structures for Highly Efficient Water Collection. " *Advanced Materials Interfaces*, (2019): 1901752 (featured as the **Front cover** of the issue)
3. Yang Yang, **Xiangjia Li**, Ming Chu, Haofan Sun, Jie Jin, Qifa Zhou, Yong Chen “Electrically assisted 3D Printing of Nacre-inspired Structure with Self-Sensing Capability”. *Science Advances*. 5.4, (2019): eaau9490.
4. **Xiangjia Li**, Huachao Mao, Yayue Pan, Yong Chen, “Mask Video Projection-based Stereolithography with Continuous Resin Flow”. *Journal of Manufacturing Science and Engineering*. 141(8), (2019):081007
5. **Xiangjia Li**, Yang Yang, Benshuai Xie, Ming Chu, Haofan Sun, Siyang Hao, Yiyu Chen, Yong Chen, “3D Printing of Flexible Liquid Sensor based on Swelling behavior of Hydrogel with Carbon Nanotubes”. *Advanced Materials Technologies*. (2018): 1800476.
6. Jun Zhang, Yang Yang, Benpeng Zhu, **Xiangjia Li**, Jie Jin, Zeyu Chen, Yong Chen, Qifa Zhou “Multifocal Point Beam Forming by A Single Ultrasonic Transducer with 3D Printed

Holograms". *Applied Physics Letters*. 113(24), (2018).

7. Yuen-Shan Leung, Tsz-Ho Kwok, **Xiangjia Li**, Yang Yang, Charlie C.L. Wang, Yong Chen, "Challenges and Status on Design and Computation for Emerging Additive Manufacturing Technologies" *The ASME Journal of Computing and Information Science in Engineering*. 19(2), (2019):021013.
8. **Xiangjia Li** Benshuai Xie, Jie Jin, Yang Chai, and Yong Chen. "3D Printing Temporary Crown and Bridge by Temperature Controlled Mask Image Projection Stereolithography." *Procedia Manufacturing* 26 (2018): 1023-1033.
9. Yang, Yang, Xuan Song, **Xiangjia Li**, Zeyu Chen, Chi Zhou, Qifa Zhou, and Yong Chen. "Recent Progress in Biomimetic Additive Manufacturing Technology: From Materials to Functional Structures." *Advanced Materials* 30(36) (2018): 1706539.
10. Yang, Yang, **Xiangjia Li (Co-First author)**, Xuan Zheng, Zeyu Chen, Qifa Zhou, and Yong Chen. "3D-Printed Biomimetic Super-Hydrophobic Structure for Microdroplet Manipulation and Oil/Water Separation." *Advanced Materials* 30(9) (2018): 1704912. (featured as the **Inside Back Cover** of the issue)
11. Chen, Zeyu, Yue Wu, Yang Yang, Jiapu Li, Benshuai Xie, **Xiangjia Li**, Shuang Lei et al. "Multilayered Carbon Nanotube Yarn based Optoacoustic Transducer with High Energy Conversion Efficiency for Ultrasound Application." *Nano energy* 46 (2018): 314-321.
12. **Xiangjia Li** and Yong Chen. "Micro-scale Feature Fabrication using Immersed Surface Accumulation." *Journal of Manufacturing Processes* 28 (2017): 531-540.
13. Lei, Weijun, Xiaosheng Cheng, Ning Dai, Baosu Guo, and **Xiangjia Li**. "Multi-Model Machining Path Planning Based on Improved Genetic Algorithm." *Journal of Mechanical Engineering* 50.11 (2014): 153-161.

*Paper (Under preparation)*

14. **Xiangjia Li**, Tommaso Baldacchini, Yong Chen, "An Investigation of Integrated Multi-scale 3D Printing for Hierarchical Structures Fabrication." Virtual and Physical Prototyping (under preparation)
15. **Xiangjia Li**, Weitong Shan, Yiyu Chen, Yuan Yuan, Jiahui Rong, Yang Chai, Yong Chen, "3D Printing Trimmable Bioceramic Scaffold with High Mechanical Performances for Bone Tissue Regeneration." (under preparation)
16. **Xiangjia Li**, Weitong Shan, Yang Yang, Yiyu Chen, Yuan Yuan, Yang Chai, Yong Chen, "Limpet Teeth Inspired Painless Microneedles Fabricated by Magnetic Field Assisted 3D Printing ". (under preparation)

Conference Proceedings (Full paper review):

17. Yang Yang, Jie Jin, **Xiangjia Li**, Yong Chen, "Electrically Assisted 3D Printing of Bioinspired Structures". *3<sup>rd</sup> World Congress on Micro and Nano Manufacturing*

*Conference, WCMNM2019, 09.10 – 09.12, 2019.*

18. **Xiangjia Li**, Yong Chen, “Multi-scale 3D Printing of Bioinspired Structures for Functional Surfaces”. *Proceedings of International Symposium on Flexible Automation, ISFA2018*, 15 - 19 July, 2018.
19. **Xiangjia Li**, Yong Chen, “3D Printing Temporary Crown and Bridge by Temperature Controlled Mask Image Projection Stereolithography” *46<sup>th</sup> SME North American Manufacturing Research Conference, NAMRC46*, Texas, USA, 2018.
20. **Xiangjia Li**, Huachao Mao, Yayue Pan, Yong Chen, “Mask Video Projection Based Stereolithography With Continuous Resin Flow to Build Digital Models in Minutes”. *Proceedings of the ASME 2018 International Manufacturing Science and Engineering Conference. MSEC2018*, 06.18-06.22, Texas, USA, 2018.
21. **Xiangjia Li**, Yang Yang, Yong Chen, “Bio-inspired Micro-Scale Texture Fabrication based on Immersed Surface Accumulation Process”. *Proceedings of the World Congress on Micro and Nano Manufacturing Conference, WCMNM2017*, PP:33-36, 2017.
22. Yang Yang, Jun Zhang, Zeyu Chen, **Xiangjia Li**, Jie Jin, K Kirk Shung, Yong Chen, Qifa Zhou. “Multi-focused Acoustic Holograms by 3D Printing”. In *Ultrasonics Symposium (IUS), 2017 IEEE International* (pp. 1-1). IEEE.
23. **Xiangjia Li**, Baldacchini T, Xuan Song, Yong Chen, “Multi-scale Additive Manufacturing: An Investigation on Building Objects with Macro-, Micro- and Nano-scales Features”. *The 11th International Conference on Micro Manufacturing. ICOMM2016*, Irvine, CA, USA.
24. **Xiangjia Li**, Ning Dai, Wenhe Liao, A Fault-tolerant Offset Algorithm for Measured Data with Defects. *2<sup>nd</sup> International Conference on Manufacturing Engineering and Technology for Manufacturing Growth. METMG2014*, Miami, Florida, USA.

### Book Chapter

1. Yang Yang, **Xiangjia Li**, Yong Chen, “Additive Manufacturing of Bio-inspired Structures via Nanocomposite 3D Printing” in edited book titled “Recent Advances in Additive Manufacturing” (Accepted) Publisher: World Scientific Publishing
2. **Xiangjia Li**, Yong Chen, “Vat Photopolymerization based Ceramic Manufacturing” in ASM Handbook Volume 24: Additive Manufacturing Processes. (Accepted) Publisher: ASM International

### **Provisional Patent Applications**

1. Yong Chen, Huachao Mao, and **Xiangjia Li**, University of Southern California, 2016. “Mask Video Projection Based Stereolithography with Continuous Resin Flow”. U.S. Patent Application 15/187, 713 ([link](#))
2. Yong Chen, **Xiangjia Li**, “Surface-based CNC Accumulation: A High-Resolution 3D Printing

Process" U.S. Patent Application 15/868, 891 ([link](#))

3. Yang Chai, Yong Chen, **Xiangjia Li**, Yuxing Guo, Yuan Yuan. "Stem Cells and Devices for Bone Regeneration". International Patent Application 62/584, 052 ([link](#))
4. Yong Chen, **Xiangjia Li**, Yang Yang, "3D-Printed Superhydrophobic and Superoleophilic Structures for Oil/Water Separation and Recycle". U.S. Provisional Patent Application filed October 2017
5. Yang Chai, Yong Chen, **Xiangjia Li**, "3D Printing Trimmable Bioceramic Scaffold with High Mechanical Performance for Bone Tissue Regeneration" U.S. Provisional Patent Application filed on Nov 2019

## ***Presentations and Talks***

### ***Conference Presentation--- August 5, 2015***

*"Mask Video Projection based Stereolithography with Continuous Resin Flow for Building Digital Models in Minutes"*, Solid Freeform Fabrication Symposium, SFF 2015, Austin, Texas.

### ***Conference Presentation--- March 3, 2016***

*"Multi-scale Additive Manufacturing: An Investigation on Building Objects with Macro-, Micro- and Nano-scales Features."*, 11<sup>th</sup> International Conference on Micro Manufacturing, ICOMM 2016, Irvine, CA.

### ***Conference Presentation--- August 9, 2016***

*"Surface-based CNC Accumulation: A Flexible High Resolution Additive Manufacturing Process"*, Solid Freeform Fabrication Symposium, SFF 2016, Austin, Texas.

### ***Conference Presentation--- June 6, 2017***

*"Micro-scale Feature Fabrication using Immersed Surface Accumulation"*, 45<sup>th</sup> Society of Manufacturing Engineers (SME) North American Manufacturing Research Conference (NAMRC45), 2017, Los Angeles, CA.

### ***Conference Presentation--- August 8, 2017***

*"Bio-inspired Micro-Scale Texture Fabrication based on Immersed Surface Accumulation Process"*, Solid Freeform Fabrication Symposium, SFF 2017, Austin, Texas.

### ***Conference Presentation--- August 9, 2017***

*"3D Printed Bio-inspired Humidity Sensor based on Swelling Kinetics of Carbon Nanotube Composite Hydrogel"*, Solid Freeform Fabrication Symposium, SFF 2017, Austin, Texas.

### ***Seminar Presentation--- March 2, 2018***

*"Multi-scale 3D printing of Bioinspired Functional Structures"*, Daniel J. Epstein Dept. of Industrial & System Engineering PhD Open House, University of Southern California, Los Angeles, CA.

### ***Proposal Presentation--- April 27, 2018***

*"Multi-scale Additive Manufacturing of Biomimetic Functional Materials and Structures",*  
University of Southern California, Los Angeles, CA.

***Conference Presentation--- June 19, 2018***

*"3D Printing Temporary Crown and Bridge by Temperature Controlled Mask Image Projection Stereolithography",* 46<sup>th</sup> SME North American Manufacturing Research Conference, NAMRC46, 2018, Texas, USA.

***Conference Presentation--- June 20, 2018***

*"Mask Video Projection Based Stereolithography with Continuous Resin Flow to Build Digital Models in Minutes",* ASME 2018 International Manufacturing Science and Engineering Conference. MSEC2018, 2018, Texas, USA.

***Seminar Presentation--- November 18, 2018***

*"Multi-scale 3D Printing of Bioinspired Functional Structures"* Viterbi EXPO, University of Southern California, Los Angeles, CA.

***Seminar Presentation--- January 23, 2019***

*"Multi-scale Additive Manufacturing of Bioinspired Functional Material"* Department of Mechanical Engineering, University of Connecticut.

***Seminar Presentation--- January 29, 2019***

*"Multi-scale Additive Manufacturing of Bioinspired Functional Structures"* Department of Mechanical Engineering, University of New Hampshire.

***Seminar Presentation--- February 26, 2019***

*"Multi-scale 3D Printing of Bioinspired Functional Material"* Department of Mechanical Engineering, University of Georgia.

***Seminar Presentation--- April 19, 2019***

*"Multi-scale 3D Printing of Bioinspired Functional Structures"* Annual ISE Research Festival, University of Southern California, Los Angeles, CA.

## **TEACHING AND EDUCATION**

### ***Teaching and Course Development***

Arizona State University

*MAE 301 "Applied Experimental Statistics", Spring, 2020*

University of Southern California

*ISE 511L "Mechatronics Systems Engineering", Fall, 2018*

*BME 551 Introduction to Bio-MEMS and Nanotechnology, Spring, 2019*



## ***Research Supervision***

### ***In Progress:***

#### *Graduate Student:*

Aaditya Rajendra Raje (Mechanical Engineering)      Xiaotian Shen (Mechanical Engineering)

#### *Undergraduate Student:*

Dylan Joralmon (Aerospace Engineering)      Joshua Blair (Mechanical Engineering)

Syed Taha Iftikhar (Mechanical Engineering)

### ***Alumni:***

#### *Graduate Student:*

Weitong Shan (Material Science)

Siyang Hao (Mechanical Engineering)

Jiahui Rong (Mechanical Engineering)

Hanyu Zhao (Mechanical Engineering)

Haozhe Zi (Mechanical Engineering)

Xuan Zheng (Mechanical Engineering)

Benshuai Xie (Mechanical Engineering)

Yue Wang (Mechanical Engineering)

Jonghan Lim (Manufacturing)

Zixuan Huang (Material Science)

Qiyuan Zhang (Material Science)

Luyang Liu (Material Science)

Ming Chu (Material Science)

Haofan Sun (Material Science)

Fuyue Lei (Material Science)

Chaoran Lu (Chemical Engineering)

*Undergraduate Student:*      Yiyu Chen (Mechanical Engineering)

*High school Student:*      Maggie Shi, Steven Li

## **SERVICE**

### ***Professional Affiliations***

*Member*      *American Society of Mechanical Engineers (ASME)*

*Member*      *Society of Mechanical Engineers (SME)*

*Member*      *Women in Science and Engineering (WISE)*

*Member*      *Society of Women Engineers (SWE)*

### ***Journal and Conference Service***

*Reviewer*      *Transactions of the Canadian Society for Mechanical Engineering*

<i>Reviewer</i>	<i>13<sup>th</sup> ISVC conference 2018</i>
<i>Reviewer</i>	<i>Journal of Mechanical Engineering Science 2018</i>
<i>Reviewer</i>	<i>Journal of Micro- and Nano-Manufacturing 2017, 2019</i>
<i>Reviewer</i>	<i>ASME MSEC conference 2017</i>
<i>Reviewer</i>	<i>SME NAMRC conference 2017, 2019, 2020</i>
<i>Reviewer</i>	<i>ASME IDETC-CIE conference 2019</i>
<i>Reviewer</i>	<i>Composites Science and Technology 2020</i>
<i>Program Committee</i>	<i>ASME ISFA conference 2020</i>