Huifeng Du

PhD · Mechanical Engineering

Massachusetts Institute of Technology, 77 Massachusetts Ave, Cambridge, MA 02139

hfdu@mit.edu | Personal website | Google Scholar: Huifeng Du (Citations:1590, h-index:10)

Education and Professional Experience

Massachusetts Institute of Technology *Cambridge, MA, United States*

Postdoctoral Associate *Sep 2022 - present*

- Supervisor: Prof. Domitilla Del Vecchio

Massachusetts Institute of Technology *Cambridge, MA, United States*

PhD, MS in Mechanical Engineering *Jan 2015 - Sep 2022*

- Advisor: Prof. Nicholas Fang

Peking University *Beijing, China*

BS in Theoretical Mechanics *Sep 2010 - Jun 2014*

- Undergrad research advisor: Prof. Huiling Duan

Research Interests

- Development of fieldable biosensors for *in vitro* and environmental health monitoring
- Mechanical design and characterization of microarchitectured materials for multi-functional applications in structural engineering, acoustics, photonics and biology
- Design and manufacturing of soft composites via additive manufacturing, including stereolithography and material extrusion

Research Experience

Massachusetts Institute of Technology - Dept of Mechanical Engineering *Cambridge, MA*

Supervisor: Prof. Domitilla Del Vecchio *Sep. 2022 - Present*

- Project: "A Fieldable Process for Sensitive Detection of Airborne Viruses via Electrophoresis-based RNA Enrichment"
- Project: "Ratiometric Control of Cell Populations in Organoid Formation "

Massachusetts Institute of Technology - Dept of Mechanical Engineering *Cambridge, MA*

Advisor: Prof. Nicholas Fang *2015-2022*

- Dissertation: "Dynamic Studies of Instability-Triggered Intersonic Surface Detachment Waves in Soft Material Sliding"
- Thesis: "Finite element analysis of adhesive contact interface in continuous 3D printing"
- Metamaterials and metasurfaces
  - Project: "Underwater acoustic metamaterials"
  - Project: "Kirigami-inspired nanophotonic devices with optical functionalities"
- Additive manufacturing
  - Project: "3D printing of interpenetrating polymer networks with enhanced adhesiveness"
  - Project: "3D printing of artificial axons for study of myelinating cells' response to physical cues"
  - Project: "Ultra-low adhesive interface for continuous 3D printing"

Peking University - Dept of Mechanics *Peking, China*

Advisor: Prof. Huiling Duan *2012-2014*

- Thesis: "Effective Slip Boundary Conditions for Shear Flow Over Periodic Surfaces"

Publications (Citations: 1590, h-index:10)

*# equally contributed; * corresponding author*

First & Co-First Authored

[1] **Huifeng Du#**, Simone Bruno#, Kalon J. Overholt#, Sebastian Palacios#, Hsin-Ho Huang, Carlos Barajas, Ben Gross, Cindy Lee, Haley K Evile, Nuno Rufino de Sousa, Antonio Gigliotti Rothfuchs, Domitilla Del Vecchio*. A fieldable process for sensitive detection of airborne viruses via electrophoresis-based RNA enrichment. *Biosensors and Bioelectronics: X* (2024): 100488.

[2] Lei Zhang#, **Huifeng Du#**, Xin Sun, Feng Cheng, Wenhan Lee, Jiahe Li, Guohao Dai*, Nicholas Xuanlai Fang*, and Yongmin Liu*. 3D Printing of Interpenetrating Network Flexible Hydrogels with Enhancement of Adhesiveness. *ACS Applied Materials & Interfaces*, 15, no. 35 (2023)

[3] Xiaoyi She#, **Huifeng Du#**, Yang Shen, Rihui Xin, Nicholas X. Fang*, Chongjun Jin*. *In situ* wide-field visualization of palladium hydrogenation. *ACS Applied Materials & Interfaces*, 15, no. 36 (2022): 41531-41541

[4] Pang Zhu#, **Huifeng Du#**, Xingyu Hou#, Peng Lu, Liu Wang, Jun Huang, Ningning Bai, Zhigang Wu, Nicholas X Fang*, Chuan Fei Guo*. Skin-electrode iontronic interface for mechanosensing. *Nature Communications* 12.1 (2021): 4731.

[5] **Huifeng Du#**, Emmanuel Virot#, Liying Wang, Sam Kharchenko, Md Arifur Rahman, David A. Weitz, Shmuel M. Rubinstein*, Nicholas X. Fang*. Intersonic Detachment Surface Waves in Elastomer Frictional Sliding. *arXiv* preprint:2110.13425 (2021).

[6] Shanshan Chen#, Zhiguang Liu#, **Huifeng Du#**, Chengchun Tang#, Chang-Yin Ji, Baogang Quan, Ruhao Pan, Lechen Yang, Xinhao Li, Changzhi Gu, Xiangdong Zhang, Yugui Yao, Junjie Li*, Nicholas X Fang*, Jiafang Li*. Electromechanically reconfigurable optical nano-kirigami. *Nature communication*s 12.1 (2021): 1299.

[7] **Huifeng Du**, Chu Ma, and Nicholas X. Fang*. Echoes of fluid spin. *National Science Review*, 7, no. 1 (2020): 2-3.

[8] Zhiguang Liu#, **Huifeng Du#**, Jiafang Li#, Ling Lu, Zhi-Yuan Li*, and Nicholas X. Fang*. Nano-kirigami with giant optical chirality. *Science Advances* 4.7 (2018): eaat4436.

Co-authored

[9] Chang Liu, Zhiguang Liu, Sang-Hoon Nam, **Huifeng Du**, Xuanhe Zhao, Nicholas X Fang*. Broadband thermal management using smart cooling films. *SSRN* 4315402 (2023)

[10] Chen Shen, Charles Rohde, Colby W. Cushing, Junfei Li, Zheng Jie Tan, **Huifeng Du**, Xiuyuan Peng, Preston S. Wilson, Michael R. Haberman, Nicholas X. Fang, Steven A. Cummer*. Anisotropic Metallic Microlattice Structures for Underwater Operations. *Advanced Engineering Materials* 25, no. 6 (2023): 2201294.

[11] Colby W Cushing*, Preston S Wilson, Michael R Haberman, Chen Shen, Junfei Li, Steven A Cummer, Zheng Jie Tan, Chu Ma, **Huifeng Du**, Nicholas X Fang. 2021. Characterization of an underwater metamaterial made of aluminum honeycomb panels at low frequencies. The Journal of the Acoustical Society of America, 149(3), pp.1829-1837.

[12] Xinhao Li, **Huifeng Du**, Zhiguang Liu, and Nicholas Xuanlai Fang. "Printing Optical Materials." *ECS Meeting Abstracts*, no. 24, p. 1738. IOP Publishing, 2020.

[13] Yu Zhang#, Zhichao Dong#, Chuxin Li, **Huifeng Du**, Nicholas X Fang, Lei Wu*, Yanlin Song*. 2020. Continuous 3D printing from one single droplet. *Nature communications*, 11(1), pp.1-10.

[14] James Utama Surjadi, Libo Gao, **Huifeng Du**, Xiang Li, Xiang Xiong, Nicholas Xuanlai Fang*, Yang Lu*. 2019. Mechanical metamaterials and their engineering applications. *Advanced Engineering Materials*, 21(3), p.1800864.

[15] Lei Wu#, Zhichao Dong#, **Huifeng Du**, Chuxin Li, Nicholas X Fang*, Yanlin Song*. 2018. Bioinspired Ultra-Low Adhesive Energy Interface for Continuous 3D Printing: Reducing Curing Induced Adhesion. *Research*, 2018.

[16] Zhiguang Liu, **Huifeng Du**, Zhi-Yuan Li*, Nicholas X Fang*, Jiafang Li*. 2018. Nano-kirigami metasurfaces by focused-ion-beam induced close-loop transformation. *APL Photonics*, 3(10), p.100803.

[17] Oraib Al-Ketan, Rachid Rezgui, Reza Rowshan, **Huifeng Du**, Nicholas X Fang, Rashid K Abu Al-Rub*. 2018. Microarchitected stretching-dominated mechanical metamaterials with minimal surface topologies. *Advanced Engineering Materials*, 20(9), p.1800029.

[18] Daniela Espinosa-Hoyos#, Anna Jagielska#, Kimberly A Homan, **Huifeng Du**, Travis Busbee, Daniel G Anderson, Nicholas X Fang, Jennifer A Lewis, Krystyn J Van Vliet*. 2018. Engineered 3D-printed artificial axons. *Scientific Reports*, 8(1), pp.1-13.

[19] Daniela Espinosa-Hoyos, **Huifeng Du**, Nicholas X. Fang, and Krystyn J. Van Vliet. "Poly (HDDA)-based polymers for microfabrication and mechanobiology." MRS Advances 2, no. 24 (2017): 1315-1321.

Awards, Fellowships, & Grants

2023 April **National Science Foundation's Innovation Corps**, U.S. National Science Foundation

2020 Fall **NORA Meets BASF Challenges Best Poster Award**, Northeast Research Alliance

2014-2015 **Pappalardo Fellowship**, Dept. Of Mechanical Engineering, MIT

2012-2013 **Boeing Scholarship**, Peking University

2011-2012 **National Scholarship (top 5%)**, Peking University

2010 **Chinese Physics Olympiad (First Prize)**, Chinese Physical Society

Presentations

** presenting author*

Contributed Presentations

Huifeng Du*, Simone Bruno, Kalon Overholt, Sebastian Palacios, Pat Casey and Domitilla Del Vecchio. 2023. Rapid detection of airborne pathogens-Defeating an invisible enemy. IdeaStream 2023, MIT.

Huifeng Du*, Adel Djellouli, Emmanuel Virot, Liying Wang, Sam Kharchenko, MA Rahman, Nicholas Fang, Shmuel Rubinstein, David Weitz. 2021. Understanding and controlling the squeaking of elastomers. NORA Meeting, online.

Huifeng Du*, Emmanuel Virot, Ali Ramazani, Nicholas Fang, Shmuel Rubinstein, David Weitz, Liying Wang, Sam Kharchenko, Md Arifur Rahman. 2020. Intersonic Detachment Surface Waves in Rubber Frictional Sliding. SES virtual meeting, online.

Xinhao Li*, **Huifeng Du**, Zhiguang Liu, Nicholas Xuanlai Fang. 2020. Printing Optical Materials. ECS Meeting, online.

Emmanuel Virot*, **Huifeng Du**, Ali Ramazani, Nicholas Fang, Shmuel Rubinstein. 2019. Understanding and Controlling the Squeaking of Elastomers. NORA Meeting, Boston, MA.

Daniela Espinosa-Hoyos*,**Huifeng Du**, Nicholas X Fang, Krystyn J Van Vliet. 2016. Poly (HDDA)-based polymers for microfabrication and mechanobiology. MRS Advances, Boston, MA.

Huifeng Du*, Abulimiti Aili, Mohamed Alhosani, Nicholas X. Fang, Tiejun Zhang. 2015. Fabrication and Measurement of Hydrophobic Micropillar Structures with Projection Micro-Stereolithography. InterPACK 2015, San Francisco, CA.

Huifeng Du*, Abulimiti Aili, Mohamed Alhosani, Nicholas X. Fang, Tiejun Zhang. 2015. Additive Fabrication of Mushroom-Like Micropillars with Projection Micro-Stereolithography. Gordon Research Conferences, South Hadley, MA.

Teaching & Professional Experience

Manuscript Reviews

- *Nature Communications*
- *Proceedings of the National Academy of Sciences*
- *International Conference on Humanoid Robots (Humanoids)*
- *Science*
- *Journal of Electrochemical Society*

Teaching Activities

Jan 2015 **ELS Effective Teaching Workshop**, Teaching Assistant *MIT*

Fall 2013 **Solid Mechanics**, Teaching Assistant *Peking Univ.*