

# Meng Li, Ph.D.

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## Education

2015 Sep-2020 Feb | **Ph. D.** | **Tufts University**, MA, USA

- Major: Biomedical Engineering

2012 Sep-2015 Mar | **M. S.** | **University of Ulm**, Ulm, Germany

- Major: Advanced Materials

2009 Sep-2013 Jul | **B. E.** | **Southeast University**, Nanjing, China

- Major: Biomedical Engineering

## Research

2024 Sep-Present | **USDA NIFA Postdoc Fellow** | **Massachusetts Institute of Technology**, MA, USA

- Department of Civil and Environmental Engineering, Professor Benedetto Marelli's group  
Project: Precise underwater fish vaccination using biopolymeric microneedles

2022 Nov-2024 Aug | **Postdoc Associate** | **Massachusetts Institute of Technology**, MA, USA

- Department of Civil and Environmental Engineering, Professor Benedetto Marelli's group  
Project 1: Precise underwater fish vaccination using biopolymeric microneedles  
Project 2: Polymeric microneedles for drug delivery to plants

2020 Sep-2022 Oct | **Humboldt Postdoc Fellow** | **Max Planck Institute for Intelligent Systems**,  
Stuttgart, Germany

- Department of Physical Intelligence, Professor Metin Sitti's group  
Project 1: Creating 3D functional microdevices with molding-integrated direct laser writing  
Project 2: Micrometer scale 3D-printed magnetic cilia with metachronal programmability  
Project 3: Magnetic putty as an adaptive, self-healable, and recyclable robotic material

2015 Sep-2020 Feb | **Research Assistant** | **SilkLab, Tufts University**, MA, USA

- Department of Biomedical Engineering, Professor Fiorenzoomenetto's group  
Doctoral thesis: Optomechanical actuators based on soft magnetic composites

2014 Apr-2015 Mar | **Thesis Student** | **University of Ulm**, Ulm, Germany

- Master thesis: Measuring the magnetization of single superparamagnetic particles with on-chip manipulation

## Patents

- Published 2021 | Omenetto, F., Li, M., Systems and methods for a remote control actuator, US Patent Application 20210270253, assigned to Trustees of Tufts College

## Fellowships, Awards, Honors

- 2024 Sep| **National Institute of Food and Agriculture (NIFA) Postdoctoral Fellowship**, 2-years term, \$225,000
- 2023 Oct| Rising Stars in Soft and Biological Matter Symposium, University of Chicago, University of California, San Diego
- 2023 Oct| Future Faculty Symposium, travel award, Society of Engineering Science (SES) Annual Technical Meeting, Minneapolis, MN, USA
- 2022 Jun| 71st Lindau Nobel Laureate Meeting, selected participation
- 2020 Sep| **Alexander von Humboldt Postdoctoral Research Fellowship**, 2-years term
- 2018 Dec| Materials Research Society Graduate Student Award, Silver
- 2012 Sep| China Scholarship Council Exchange Student Scholarship, 1-year term

## Professional Certificates

- 2023 Jun| **Kaufman Teaching Certificate Program**, MIT, MA, USA
- 2023 Jun| Predictive Multiscale Materials Design, MIT Professional Education, MIT, MA, USA
- 2022 Jun| Intersectionality in Academia Workshop, Max Planck Society, Germany

## Conference Presentations

- Upcoming 2025 Jan| Underwater vaccination using biopolymeric microneedles, Conference of Research Workers in Animal Diseases, Chicago, USA
- Upcoming 2024 Dec| Food-Grade Biomaterials-Based Microneedles for Fish Vaccination in Aquaculture, Materials Research Society (MRS) Fall Meeting, Boston, USA
- Upcoming 2024 Dec| Wireless Self-Oscillating Systems with Modular Design for Multi-Modal Motion and Versatile Functions (poster presentation), MRS Fall Meeting, Boston, USA
- 2023 Nov| Magnetic Putty as a Reconfigurable, Recyclable and Accessible Soft Robotic Material, MRS Fall Meeting, Boston, USA
- 2023 Nov| 3D-Printed Micrometer-Scale Wireless Magnetic Cilia with Metachronal Programmability (poster presentation), MRS Fall Meeting, Boston, USA
- 2023 Nov| Meet the New Faculty Candidates Poster Session, MRS Fall Meeting, Boston, USA
- 2023 Nov| Biopolymeric Microneedles for Underwater Fish Vaccination (poster presentation), Best Poster Award nominee, MRS Fall Meeting, Boston, USA
- 2023 Oct| Future Faculty Symposium selected with travel award, Society of Engineering Science (SES) Annual Technical Meeting, Minneapolis, MN, USA
- 2022 Dec| Meet the Future Faculty Poster Session, MRS Fall Meeting, Boston, USA
- 2022 Aug| Poster presentation, Gordon Research Conferences-Robotics, Ventura, CA, USA
- 2021 Dec| Integrating Non-Transparent Materials with Direct Laser Writing to Create Functional Microdevices, MRS Fall Meeting, Boston, USA
- 2019 Dec| Light Responsive Magnetic Cilia for Local Actuation, MRS Fall Meeting, Boston, USA
- 2018 Nov| Flexible Optomechanical Actuators Based on Light-Induced Demagnetization of Low Curie Temperature Composites, MRS Fall Meeting, Boston, USA

## Invited Talks and Seminars

- 2024 May| National Center for Cool and Cold Water Aquaculture, USDA, Leetown, WV, USA
- 2024 Jan| Department of Mechanical Engineering, Columbia University, NYU, NY, USA
- 2023 Oct| Rising Stars in Soft and Biological Matter Symposium, University of Chicago & University of California, San Diego
- 2022 Nov| Invited speaker at the Symposium Magnetic Materials for Soft Robotics and Nanorobotics, MRS Fall Meeting, Boston, USA
- 2022 Jul| Department of Materials, ETH Zürich, Zürich, Switzerland
- 2022 Jun| Departmental Seminar, Novo Nordisk, Denmark
- 2022 Mar| Department of Mechanical and Energy Engineering, Southern University of Science and Technology, Shenzhen, China
- 2019 Jun| Maersk Mc-Kinney Moller Institute, University of Southern Denmark, Odense, Denmark
- 2019 Mar| Department of Aeronautics and Astronautics, MIT, USA

## Mentoring and Teaching Experience

- **Master Thesis Mentor** | MIT, MA, USA
  - 2023-2024| Mr. Jad Raad| Master of Engineering in Civil and Environmental Engineering  
Thesis Title: Microneedles with Enhanced Retraction Force Relative to Fish Skin
  - 2022-2023 | Ms. Colleen Wolfe| Master of Engineering in Civil and Environmental Engineering  
Thesis Title: Microneedles for Drug Delivery in Aquaculture  
Best CEE Master Thesis Poster Award
- 2017 Spring Semester| **Teaching Assistant** | Tufts University, USA
  - Course name: Principles of Medical Imaging
  - Department of Biomedical Engineering, instructor: Prof. Dr. Sergio Fantini
- 2016 Fall Semester| **Teaching Assistant** | Tufts University, USA
  - Course name: Introduction to Biomedical Engineering
  - Department of Biomedical Engineering, instructor: Prof. Dr. Fiorenzoomenetto
- 2014 Fall Semester| **Laboratory Instructor** | University of Ulm, Germany
  - Course name: Materials Science Laboratory
  - Advanced Materials Master Program
- 2014 Spring semester| **Teaching Assistant** | University of Ulm, Germany
  - Course name: Materials Science II
  - Advanced Materials Master Program, instructor: Prof. Dr. Ulrich Herr

## Outreach

- 2024 Aug| After Dark, demonstrator, MIT Museum
- 2024 Apr| Nature Driven Design Panel and Demonstration, demonstrator, MIT Museum
- 2023 Sep| Cambridge Science Festival, presenter and demonstrator, MIT Museum
- 2016-2019| Annual Community Day, demonstrator, Tufts University

## Service

- 2024| Lead symposium organizer, 2025 MRS Fall Meetings
- 2023 Jun-preset| Device steward for training new users for the HR-20 Rheometer (TA Instruments) at the Institute for Soldiers Nanotechnologies, MIT
- 2022| PhD application evaluator of the Max Planck ETH Center for Learning Systems (CLS) Doctoral Fellowship Program
- 2021 Sep| Election Committee Member of the PostdocNet representative of the Max Planck Institute of Intelligent Systems
- 2021 Nov| PhD application evaluator of the International Max Planck Research School for Intelligent Systems (IMPRS-IS)

## Publication List

[Google Scholar profile](#) (as of 11/26/2024, citation: 1406, h-index: 15)

\* indicates equal contribution

### In preparation

1. **Li, M.**, Raad, J., Cao, Y., Wolfe, C., Kurath, G., Wiens, G., Marelli, B., Underwater precise fish vaccination using biopolymeric microneedles
2. Koh, S. S.\*, **Li, M.\***, Cao, Y., Goh, K., Marelli, B., Urano, D., Biomaterials designer for plant-microneedle interfaces, submitted
3. Fu, Y.\*, **Li, M.\***, Pal, A., Wang, Y., Lu, Y., Wireless self-oscillating systems with modular design for multi-modal motion and versatile functions

### First author/co-first author publications

4. **Li, M.**, Pal, A., Byun, J., Gardi, G., Sitti, M., Magnetic putty as a reconfigurable, recyclable, and accessible soft robotic material. *Advanced Materials*, 2304825 (2023).
5. Zhang, S.\*, Hu, X.\*, **Li, M.\***, *et al.*, Sitti, M., 3D-printed micrometer-scale wireless magnetic cilia with metachronal programmability. *Science Advances* 9, ead9462 (2023).
6. Liu, Z.\*, **Li, M.\***, Dong, X., Ren, Z., Hu, W., Sitti, M., Creating three-dimensional magnetic functional microdevices via molding-integrated direct laser writing. *Nature Communications* 13, 2016 (2022).
7. **Li, M.\***, Pal, A.\*, Aghakhani, A.\*, Pena-Francesch, A.\*, Sitti, M., Soft actuators for real-world applications. *Nature Reviews Materials* 7, 235-249 (2022).
8. Wang, Y.\*, **Li, M.\***, *et al.*, Omenetto, F. G., Light-activated shape morphing and light-tracking materials using biopolymer-based programmable photonic nanostructures. *Nature Communications* 12, 1–9 (2021).
9. **Li, M.**, Kim, T., Guidetti, G., Wang, Y., Omenetto, F. G., Optomechanically actuated microcilia for locally reconfigurable surfaces. *Advanced Materials* 32, e2004147 (2020).
10. **Li, M.**, Optomechanical actuators based on soft magnetic composites. *ProQuest Dissertations and Theses* (2020).
11. **Li, M.**, Ostrovsky-Snider, N. A., Sitti, M., Omenetto, F. G., Cutting the cord: progress in untethered soft robotics and actuators. *MRS Advances* 4, 2787–2804 (2019).

12. Li, M.\*, Wang, Y.\*, Chen, A., Naidu, A., Napier, B. S., Li, W., Rodriguez, C. L., Crooker, S. A., Omenetto, F. G., Flexible magnetic composites for light-controlled actuation and interfaces. *PNAS* 115, 8119–8124 (2018)

### Collaborated publications

13. Wang, Z., Li, M., Fu, Y., Wang, Y., Lu, Y., Multi-mode and multi-level physical unclonable functions using birefringent and luminescent calcite imprints on biodegradable substrate, *Advanced Materials*, accepted (2024)
14. Zhang, Y., Sun, H., Cao, Y., Kalinowski, M. J., Li, M., Marelli, B., Directed assembly of proteinaceous-polysaccharide nanofibrils to fabricate membranes for emerging contaminant remediation. *ACS Nano* doi:10.1021/acsnano.4c07409 (2024)
15. Hu, Y., Cao, Y., Nguyen, F. M., Frank, B. D., Kalinowski, M. J., Li, M., Rajani, S., Marelli, B., Antibody-targeted phytohormone delivery using foliar sprayed silk fibroin Pickering emulsions. *Advanced Functional Materials*, 2402618 (2024)
16. Han, J.\*, Dong, X.\*, Yin, Z., Zhang, S., Li, M., Zheng, Z., Ugurlu, M. C., Jiang, W., Liu, H., Sitti, M., Actuation-enhanced multifunctional sensing and information recognition by magnetic artificial cilia arrays. *PNAS* 120 (42), e2308301120 (2023).
17. Soon, R. H.\*, Ren, Z.\*, Hu, W.\*, Bozuyuk, U., Yildiz, E., Li, M., Sitti, M., On-demand anchoring of wireless soft miniature robots on soft surfaces. *PNAS* 119 (34), e2207767119 (2022).
18. Wang, T., Ugurlu, H., Yan, Y., Li, M., Li, M., Wild, A.-M., Yildiz, E., Schneider, M., Sheehan, D., Hu, W., Sitti, M., Adaptive wireless millirobotic locomotion into distal vasculature. *Nature Communications* 13, 4465 (2022).
19. Jha, A. K., Douglas, E. S., Li, M., Fucetola, C., Omenetto, F. G., Demonstration of magnetic and light-controlled actuation of a photomagnetically actuated deformable mirror for wavefront control. *Optical Engineering* 60 (12), 124102 (2021).
20. Matzeu, G.\*, Mogas-Soldevila, L.\*, Li, W., Naidu, A., Turner, T. H., Gu, R., Blumeris, P. R., Song, P., Pascal, D. G., Guidetti, G., Li, M., Omenetto, F. G., Large-scale patterning of reactive surfaces for wearable and environmentally deployable sensors. *Advanced Materials* 32, e2001258 (2020).
21. Jha, A. K., Li, M., Douglas, E. S., Maier, E. R., Omenetto, F. G., Fucetola, C., Modelling light-controlled actuation of flexible magnetic composite structures using the finite element method (FEM). *Proc. SPIE 11477, Molecular and Nano Machines III*, 1147704 (2020).
22. Wang, Y., Li, M., Wang, Y., Silk: a versatile biomaterial for advanced optics and photonics (Invited). *Chinese Optics Letters* 18, 80004 (2020).
23. Wang, Y.\*, Huang, W.\*, Wang, Y., Mu, X., Ling, S., Yu, H., Chen, W., Guo, C., Watson, M. C., Yu, Y., Black, L. D., Li, M., Omenetto, F. G., Li, C., Kaplan, D. L., Stimuli-responsive composite biopolymer actuators with selective spatial deformation behavior. *PNAS* 117, 14602–14608 (2020).
24. Li, W.\*, Wang, Y.\*, Li, M., Garbarini, L. P., Omenetto, F. G., Inkjet printing of patterned, multispectral, and biocompatible photonic crystals. *Advanced Materials* 31, e1901036 (2019).
25. Wang, Y.\*, Kim, B. J.\*, Peng, B., Li, W., Wang, Y., Li, M., Omenetto, F. G., Controlling silk fibroin conformation for dynamic, responsive, multifunctional, micropatterned surfaces. *PNAS* 116, 21361–21368 (2019).
26. Wang, Y., Li, W., Li, M., Zhao, S., Ferrari, F., Liscidini, M., Omenetto, F. G., Biomaterial-based "structured opals" with programmable combination of diffractive optical elements and photonic bandgap effects. *Advanced Materials* 31, e1805312 (2019).

27. Wang, Y., **Li, M.**, Colusso, E., Li, W., Omenetto, F. G., Designing the iridescences of biopolymers by assembly of photonic crystal superlattices. *Advanced Optical Materials* 6, 1800066 (2018).
28. Wang, Y., Aurelio, D., Li, W., Tseng, P., Zheng, Z., **Li, M.**, Kaplan, D. L., Liscidini, M., Omenetto, F. G., Modulation of multiscale 3D lattices through conformational control: painting silk inverse opals with water and light. *Advanced Materials* 29, 1702769 (2017)