

Meng Li, Ph.D.

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My research interests lie at the intersection of materials science, processing and fabrication, and design of multiscale functional devices. My past research ranges from developing composites for untethered soft actuators with new actuating mechanisms and material-embedded intelligence, to incorporating new materials and fabrication strategies for magnetic microrobots. My research vision is to develop a framework for the design and fabrication of adaptive active materials and bioinspired micromachines. I will leverage my expertise in sustainable biopolymers to minimize the environmental impacts of these devices. I will collaborate with other research groups and the industry to address real-world application problems and provide solutions to improve human and planetary health.

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

2022 Nov-Present | **Postdoc Associate** | **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

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

- 2023 Oct Upcoming| Rising Stars in Soft and Biological Matter Symposium, selected participation, University of Chicago, IL, USA
- 2023 Oct Upcoming| Future Faculty Symposium, poster presentation selected with 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
- 2018 Dec| Materials Research Society Graduate Student Award
- 2012 Sep| China Scholarship Council Exchange Student Scholarship

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

- 2023 Nov Upcoming| 3D-Printed Micrometer-Scale Wireless Magnetic Cilia with Metachronal Programmability (poster presentation), Materials Research Society (**MRS**) Fall Meeting, Boston, MA, USA
- 2023 Nov Upcoming| Biopolymeric Microneedles for Underwater Fish Vaccination (poster presentation), **MRS** Fall Meeting, Boston, MA, USA
- 2023 Nov Upcoming| Magnetic Putty as a Reconfigurable, Recyclable and Accessible Soft Robotic Material, **MRS** Fall Meeting, Boston, MA, USA
- 2021 Dec| Integrating non-transparent materials with direct laser writing to create functional microdevices. **MRS** Fall Meeting, Boston, MA, USA
- 2019 Dec| Light responsive magnetic cilia for local actuation. **MRS** Fall Meeting, Boston, MA, USA
- 2018 Nov| Flexible optomechanical actuators based on light-induced demagnetization of low curie temperature composites. **MRS** Fall Meeting, Boston, MA, USA

Invited Talks

- 2022 Nov| Symposium Magnetic Materials for Soft Robotics and Nanorobotics, **MRS** Fall Meeting, Boston, MA, 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**, MA, USA

Mentoring

Master thesis mentor| MIT, MA, USA

- 2023-2024| Mr. Jad Raad| Master of Engineering in Civil and Environmental Engineering
- 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

Teaching Experience

2023 Sep| **Guest Lecturer| Vanderbilt University, USA**

- Course name: Miniature Robotics
Lecture topic: Bioinspired Robotics, invited by Prof. Xiaoguang Dong

2023 Jun-preset| **Device Steward| MIT, MA, USA**

- Institute for Soldier Nanotechnologies
Train new users for the HR-20 Rheometer (TA Instruments)

2017 Spring Semester| **Teaching Assistant| Tufts University, MA, USA**

- Course name: Principles of Medical Imaging
Department of Biomedical Engineering, instructor: Prof. Dr. Sergio Fantini

2016 Fall Semester| **Teaching Assistant| Tufts University, MA, USA**

- Course name: Introduction to Biomedical Engineering
Department of Biomedical Engineering, instructor: Prof. Dr. Fiorenzo Omenetto

2014 Fall Semester| **Laboratory Instructor| University of Ulm, Ulm, Germany**

- Course name: Materials Science Laboratory
Advanced Materials Master Program

2014 Spring semester| **Teaching Assistant| University of Ulm, Ulm, Germany**

- Course name: Materials Science II
Advanced Materials Master Program, instructor: Prof. Dr. Ulrich Herr

Outreach Experience & Service

- 2023 Sep| MIT Museum, Cambridge Science Festival Presenter

- 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)
- 2016-2019| Tufts University, Community Day Presenter

Publication List

[Google Scholar profile](#) (09/19/2023, citation: 811, h-index: 13)

* indicates equal contribution

1. **Li, M.**, Pal, A., Byun, J., Gardi, G., Sitti, M., Magnetic putty as a reconfigurable, recyclable, and accessible soft robotic material. *Advanced Materials*, accepted (2023).
2. 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*, accepted (2023).
3. Zhang, S.* , Hu, X.* , **Li, M.***, *et al.*, Sitti, M., 3D-printed micrometer-scale wireless magnetic cilia with metachronal programmability. *Science Advances* 9 (2023).
4. 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).
5. 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).
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. 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).
9. 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).
10. **Li, M.**, Kim, T., Guidetti, G., Wang, Y., Omenetto, F. G., Optomechanically actuated microcilia for locally reconfigurable surfaces. *Advanced Materials* 32, e2004147 (2020).
11. 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).
12. 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).

13. Wang, Y., **Li, M.**, Wang, Y., Silk: a versatile biomaterial for advanced optics and photonics (Invited). *Chinese Optics Letters* 18, 80004 (2020).
14. 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).
15. **Li, M.**, Optomechanical actuators based on soft magnetic composites. *ProQuest Dissertations and Theses* (2020).
16. **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).
17. 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).
18. 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).
19. 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).
20. **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)
21. 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).
22. 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).