Xianwen Mao

Postdoctoral Associate
Department of Chemistry and Chemical Biology, Cornell University
Phone: 617-692-0787
Email: xm28@cornell.edu
Website: https://maoxianwen.wixsite.com/website

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA
Ph.D. in Chemical Engineering, 2014. Minor in Finance and Economics.
Advisors: T. Alan Hatton, Gregory C. Rutledge

Massachusetts Institute of Technology, Cambridge, MA
M.S. in Chemical Engineering Practice, 2014.

Tsinghua University, Beijing, China
B.S. in Polymer Materials and Engineering, 2008.

RESEARCH APPOINTMENTS

Postdoctoral Researcher
Cornell University, Department of Chemistry and Chemical Biology, P. Chen Research Group, Ithaca, NY (Sep 2016 present)

- Development of operando imaging techniques for visualizing nonfluorescent processes at super-resolution
- Elucidation of photoelectrochemical energy conversion processes via single-molecule/single-particle analysis

Postdoctoral Researcher
Massachusetts Institute of Technology, Department of Chemical Engineering, T. A. Hatton and G. C. Rutledge Research Groups, Cambridge, MA (Feb 2014 Aug 2016)

- Electrochemically responsive polymer interfaces for controlling heterogeneous catalysis and surface adsorption
- Interfacial behaviors and electrochemical properties of amphiphilic liquid systems with long-range ordering

Graduate Researcher
Massachusetts Institute of Technology, Department of Chemical Engineering, T. A. Hatton and G. C. Rutledge Research Groups, Cambridge, MA (Jan 2009 Feb 2014)

- Structural manipulation of polymer-derived carbon electrodes to modulate their electronic properties and electrochemical activities
- Synthesis of redox-responsive polymer gels and modelling of their hydrophilic-hydrophobic transition

Research Intern
National Renewable Energy Lab, Golden, CO (Oct 2009 Dec 2009)

- Implemented numerical modeling/simulation of biomass gasification processes in fluidized bed reactors.

Technical Consultant
Novartis Vaccine & Diagnostics, Siena, Italy (Aug 2009 Oct 2009)

- Developed downscale models to optimize lyophilization technologies for commercial vaccines.

Undergraduate Researcher
Tsinghua University, Institute of Polymer Science and Engineering, Y. Huang Research Group, Beijing, China (Jun 2007 Jun 2008)

- Design and synthesis of pH-sensitive polymer-anticancer drug conjugates via ring-opening metathesis polymerization (ROMP) for tumor targeting.

Research Intern
BASF Co. Ltd., Shanghai, China (Aug 2007)
- Investigated large-scale manufacturing of advanced polymeric materials

Undergraduate Researcher
Tsinghua University, Institute of Polymer Science and Engineering, L. Tang Research Group, Beijing, China (Jun 2006 Jun 2007)
- Synthesis of block copolymers using RAFT and ATRP techniques, and examination of their self-assembly behavior

Research and Development Intern
Shenma Group Co., Pingdingshan, China. (Jul 2007 Aug 2007)
- Investigated the technology for large-scale production of polyamide 66.

Process Research Intern
Yansan Petrochemical Co., Beijing, China. (Aug 2006 Sep 2006)
- Designed and investigated the integrated production network for the phenol-acetone line.

AWARDS AND HONORS

- MIT Water Innovation Prize First Place, 2016
- The Veraqua Prize, MIT, 2016
- American Chemical Society Eastman Chemical Student Award Finalist, 2014
- Skoltech Fellowship, Chemical Engineering, MIT, 2013
- Fiber Society Graduate Student Paper Competition Award Frist Prize, 2012
- MIT-Harvard Business Case Competition Award Third Prize, 2009
- Bayer Fellowship, Chemical Engineering, MIT, 2008
- Institute Outstanding Graduate Award (top 1% for overall excellence), Tsinghua University, 2008
- BASF Summer Course Best Performance Award, 2007
- Dow Chemical Scholarship (top 5% for overall excellence), Tsinghua University, 2007
- DuPont Scholarship (top 5% for overall excellence), Tsinghua University, 2006
- Dow Chemical Scholarship (top 5% for overall excellence), Tsinghua University, 2005
- National Scholarship for Outstanding Academic Performance, Tsinghua University, 2004
- National Chemistry Olympiad Competition China Gold Metal, 2004

PUBLICATIONS

(* Corresponding author;

Work in Progress

29. **Mao**, **X.;** Wang, E.; Escobedo, F. A.; Coates, G. W.; Chen, P.*, Tuning single polymer growth via hydrogen bonding in conformational entanglements. *In preparation.*

28. **Mao**, **X.;** Chen, P.*, Interfacet 2D lateral junction on a 3D particle governs its photoelectrode performance. *In preparation.*

27. **Mao**, **X. ;**
Heterogeneous Ca

24. **Mao, X.**
A. A. H.; Gomes, M. F. C.*; Hatton, T. A.*, Self-assembled nanostructures in ionic liquids facilitate charge storage at electrified interfaces. ***Nature Mater.*** **2019**, DOI: 10.1038/s41563-019-0449-6.

- Featured in *MIT News*
- Featured in *MIT Main Page Spotlights* (
more energy compared to conventional electrolytes. Using these liquids in certain energy-storage devices

- Featured in *New York Times*
- Featured in *UWA News*
- Featured in *Materials Today*
- Other news highlight: *SciTechDaily, PV Magazine, New Zealand Herald, University of Bristol News, SpaceDaily, Phys.org, Nanowerk, University of Chester News, AZO Materials, LongRoom News, EurekAlert!, Institution of Mechanical Engineers News, WorldProNews, EnergyDaily, SciGlow News, Mirage News, ScienceDaily, Innovations Report, Industry Update*, etc.

23. **Mao, X.**; Liu, C.;, Hesari, M.; Zou, N.; Chen, P.*, Super-resolution imaging of nonfluorescent reactions via competition. ***Nature Chem.*** **2019**, *11*, 687-694.

- Featured on the front cover of *Nature Chemistry*.
- Featured in *Cornell Chronicle*
- Featured in *Chem. Eng. News*
- Featured in *Microscopy and Analysis Editorial* -
- Featured in *Photonics Media*
- Featured in Dutch News platform [*C2w*
- Other news highlight: *EurekAlert!, Phys.org, Nanowerk, Newswise, ScienceDaily, Environmental News Network, Azooptics, Science360 News, Sohu News China, Laser Focus World Japan,* etc.

22. **Mao, X** ingle-
Molecule Perspective. ***ACS Catal.*** **2019,** *9* (3), 1985-1992.

21. Hesari, M.; Sambur, J. B.; **Mao, X**.; Jung, W.; Chen, P.*, Quantifying Photocurrent Loss of a Single Particle Particle Interface in Nanostructured Photoelectrodes. ***Nano Lett.*** **2019,** *19* (2), 958-962.

- Featured in *Cornell Chronicle:*

20. Ren, Y.; Lin, Z.; **Mao, X**.; Tian, W.; Van Voorhis, T.; Hatton, T. A.*, Superhydrophobic, Surfactant-doped, Conducting Polymers for Electrochemically Reversible Adsorption of Organic Contaminants. ***Adv. Funct. Mater.*** **2018,** *28* (32), 1801466.

19. **Mao, X**.; Tian, W.; Ren, Y.; Chen, D.; Curtis, S. E.; Buss, M. T.; Rutledge, G. C.; Hatton, T. A.*, Energetically efficient electrochemically tunable affinity separation using multicomponent polymeric nanostructures for water treatment. ***Energy Environ. Sci.*** **2018,** *11* (10), 2954-2963.

18. Zou, N.; Chen, G.; **Mao, X.**; Shen, H.; Choudhary, E.; Zhou, X.; Chen, P.*, Imaging Catalytic Hotspots on Single Plasmonic Nanostructures via Correlated Super-Resolution and Electron Microscopy. ***ACS Nano*** **2018,** *12* (6), 5570-5579.

17. **Mao, X.** -Particle Photo(electro)catalysts: Toward
Function in Solar Energy Conversion**. *J. Am. Chem. Soc.*** **2018,** *140* (22), 6729-6740.

- Featured in *JACS* - *J. Am. Chem. Soc.*
2018, 140, 6727-6728.

16. **Mao, X.**
Electrochemically Active Polymers by Vapor-Deposited Organic Networks. ***Adv. Funct. Mater.*** **2018,** *28* (10), 1706028.

15. **Mao, X.**; Guo, F.; Yan, E. H.; Rutledge, G. C.; Hatton, T. A.*, Remarkably High Heterogeneous Electron Transfer Activity of Carbon-Nanotube-Supported Reduced Graphene Oxide. ***Chem. Mater.***

4. Hatton, T. A.; **Mao, X.**; Brown, P.; Gomes, M. F. C.; High-temperature supercapacitors containing surface active ionic liquids. U.S. Patent Application No. 16/323,468. Filed February 5, 2019.

3. Liu, A.; Gleason, K. K.; Hatton, T. A.; **Mao, X.**; Enhancing performance stability of electroactive polymers by vapor-deposited organic networks. U.S. Patent Application No. 16/036,010. International Patent Application No. PCT/US2018/042231. Filed July 16, 2018.

2. **Mao, X**; Tian, W.; Ren, Y.; Rutledge, G. C.; Hatton, T. A.; Adsorbents, systems, and methods for separation of organic species from water. U.S. Patent Application No. 16/024,493. International Patent Application No. PCT/US2018/040444. Filed June 29, 2018.

1. Hatton, T. A.; **Mao, X**; Rutledge, G. C.; Tian, W.; Wu, J.; Electrochemically responsive composites of redox polymers and conducting fibers. U.S. Patent Application No. 14/942,221. International Patent Application No. PCT/US2015/060873. Filed November 16, 2015.

TEACHING EXPERIENCE

Massachusetts Institute of

- Wenda Tian obtained her BS degree in Chemical Engineering from UC Berkeley and her PhD in Chemical Engineering from MIT Hatton/Rutledge groups, and now is a management consultant at McKinsey & Company (San Francisco).
- This student co-authored 7 manuscripts with me: *Adv. Funct. Mater.* 2018, *28* (32), 1801466; *Energy Environ. Sci.* 2018, *11* (10), 2954-2963; *Adv. Funct. Mater.* 2018, *28* (10), 1706028; *Anal. Bioanal. Chem.* 2016, *408* (5), 1307-1326; *Chem. Mater.* 2015, *27* (13), 4574-4585; *Adv. Funct. Mater.* 2015, *25* (30), 4803-4813; *J. Am. Chem. Soc.* 2015, *137* (3), 1348-1355.

Research mentor for graduate student Yinying Ren (Jan 2015 Sep 2016)

- Yinying Ren obtained her BS degree in Chemical Engineering from Northwestern University and her PhD in Chemical Engineering from MIT Hatton group, and now is a management consultant at McKinsey & Company (Shanghai).
- This student co-authored 4 manuscripts with me: *Nature Mater.* 2019, DOI: 10.1038/s41563-019-0449-6; *ACS Cent. Sci.* 2019, *5* (8), 1396-1406; *Adv. Funct. Mater.* 2018, *28* (32), 1801466; *Energy Environ. Sci.* 2018, *11* (10), 2954-2963.

Massachusetts Institute of Technology, Department of Chemical Engineering
Research mentor for undergraduate research interns

Name	*Time*		*Then*
James Hedrick	Jan 2013	May 2013 (40 hr/week)	MIT, Chemical Engineering
Esther Yan	May 2013	Aug 2014 (12 hr/week)	Boston University, Chemistry & Economics
Raef Zebian	July 2014	Sep 2014 (40 hr/week)	American University of Beirut, Chemistry
Jennifer Subler	Dec 2014	Aug 2015 (12 hr/week)	MIT, Chemical Engineering
Anne Dunn	Jan 2015	May 2015 (12 hr/week)	MIT, Materials Science & Engineering
Videh Seksaria	Jan 2015	Aug 2015 (12 hr/week)	MIT, Chemical Engineering
Brook Eyob	Jan 2015	Aug 2015 (12 hr/week)	MIT, Chemical Engineering
Leah Schmitz	Jan 2015	May 2015 (12 hr/week)	MIT, Chemical Engineering
Barbara Lima	Jan 2015	May 2015 (12 hr/week)	MIT, Chemical Engineering
Arica Wyche	Jan 2015	May 2015 (12 hr/week)	MIT, Chemical Engineering
Grecia Monsalve	Jul 2015	Aug 2015 (40 hr/week)	Imperial College London, Chemistry
Tarek Lahoud	Jun 2015	Aug 2015 (40 hr/week)	American University of Beirut, Chemistry
Dexin Chen	Jan 2015	Jun 2016 (12 hr/week)	MIT, Materials Science & Engineering
Ayomide Fatunde	Sep 2015	Dec 2015 (12 hr/week)	MIT, Chemical Engineering
Phuong Pham	Sep 2015	Dec 2015 (12 hr/week)	MIT, Chemical Engineering
Sarah Curtis	Sep 2015	Jun 2016 (12 hr/week)	MIT, Chemical Engineering

PRESENTATIONS

(Contributed presentations are many, and are not listed here)

- Invited Oral Presentation -
  Mao, X.; Hesari, M.; Zou, N.; Chen, P.; ECS Annual Meeting, Seattle, WA, May 2018.

- **Mao, X.**; Tian, W.; Wu, J.; Hatton, T. A.; Rutledge, G. C.; Fiber Society Fall Conference, Ithaca, NY, October 2016.

- Invited Oral Presentation: **Mao, X.**; Zhang, Y. X; Hatton, T. A.; Tuller, H. L.; Rutledge, G. C.; PITTCON Conference&Expo, Atlanta, GA, March 2016.

- Invited Oral Presentation **Mao, X.**; Rutledge, G. C.; Hatton, T. A.; Department of Chemical and Biomolecular Engineering, Unviersity of California Los Angeles, Los Angeles, CA, February 2016.

- tured surfactant ionic liquids with unusually high capacitances for high- **Mao, X.**; Brown, P.; Gomez, M.; Rutledge, G. C.; Hatton, T. A.; AICHE Annual Meeting, Salt Lake City, UT, November 2015.

- ctrochemical Control over Reaction Kinetics Using Rationally Designed Redox- **Mao, X.**; Tian, W.; Wu, J.; Rutledge, G. C.; Hatton, T. A.; AICHE Annual Meeting, Salt Lake City, UT, November 2015.

- **Mao, X.**; Tian, W.; Wu, J.; Rutledge, G. C.; Hatton, T. A.; Capacitive Deionization and Electrosorption (CDI&E) Conference, Saarbrucken, Germany, October 2015.

- Invited Oral Presentation **Mao, X.**; Rutledge, G. C.; Hatton, T. A.; Department of Chemical and Biomolecular Engineering, Unviersity of Melbourne, Melbourne, Australia, October 2015.

- ids with unusually high capacitances for high-temperature flexible **Mao, X.**; Brown, P.; Gomez, M.; Rutledge, G. C.; Hatton, T. A.; ACS National Meeting, Boston, MA, August 2015.

- ansfer activity of carbon nanotube-supported **Mao, X.**; Guo, F.; Yan, Esther H.; Rutledge, G. C.; Hatton, T. A.; ACS National Meeting, Boston, MA, August 2015.

- ally Responsive Heterogeneous **Mao, X.**; Tian, W.; Wu, J.; Rutledge, G. C.; Hatton, T. A.; ACS National Meeting, Boston, MA, August 2015.

- **Mao, X.**; Tian, W.; Su, X.; Rutledge, G. C.; Hatton, T. A.; MIT PPST Polymer Day, Cambridge, MA, March 2015.

- -Based Porous Materials for Electrochemically Responsive **Mao, X.**; Tian, W.; Su, X.; Rutledge, G. C.; Hatton, T. A.; MIT Water Night, Cambridge, MA, March 2015.

- Reduced Graphene Oxide/Carbon Nanotube Hybrids with Tunable Electronic Structure **Mao, X.**; Guo, F.; Yan, E. H.; Rutledge, G. C.; Hatton, T. A.; MRS Fall Meeting, Boston, MA, December 2014.

- Microwave-Assisted Oxidation of Electrospun Turbostratic Carbon Nanofibers for **Mao, X.**; Rutledge, G. C.; Hatton, T. A.; MITEI Annual Research Conference, Cambridge, MA, November 2014.

- **Mao, X.**; Tian, W.; Wu, J.; Rutledge, G. C.; Hatton, T. A.; AICHE Annual Meeting, Atlanta, GA, November 2014.

- Invited Oral Presentation: -Derived Electrospun Turbostratic Carbon Nanofibers with Controlled **Mao, X.**; Rutledge, G. C.; Hatton, T. A.; ACS National Meeting, San Francisco, CA, Auguest 2014.

- Pseudo- **Mao, X.**; Simeon, F.; Achilleos, D. S.; Rutledge, G. C.; Hatton, T. A.; MIT Water Night, Cambridge, MA, March 2014.

- Microwave-Assisted Oxidation of Turbostratic Carbon Nanofibers for Tailoring Energy **Mao, X.**; Yang, X. Q.; Wu, J.; Tian, W.; Rutledge, G. C.; Hatton, T. A.; MRS Fall Meeting, Boston, MA, December 2013.

- Ultrawide-Range Electrochemical Biosensing Using Electrospun Carbon Nanofibers **Mao, X.**; Yang, X. Q.; Rutledge, G. C.; Hatton, T. A.; AICHE Annual Meeting, San Fransico, CA, November 2013.

- Applications **Mao, X.**; Simeon, F.; Achilleos, D. S.; Rutledge, G. C.; Hatton, T. A.; MIT PPST Polymer Day,

Cambridge, MA, March 2013.

- Electrocapacitive Performance **Mao, X.**; Simeon, F.; Achilleos, D. S.; Rutledge, G. C.; Hatton, T. A.; MRS Fall Meeting, Boston, MA, December 2012.

- Invited Oral Presentation Electrospun Carbon Nanofiber Webs with Controlled Density of States for **Mao, X.**; Simeon, F.; Rutledge, G. C.; Hatton, T. A.; Fiber Society Fall Conference, Boston, MA, November 2012.

- The Electrocapacitive Properties of Organometallic Polymer/Multiwalled Carbon **Mao, X.**; Simeon, F.; Achilleos, D. S.; Rutledge, G. C.; Hatton, T. A.; AICHE Annual Meeting, Pittsburgh, PA, November 2012.

- Electrochemical Activity and Biosensitivity of Free-Standing Electrospun Carbon **Mao, X.**; Simeon, F.; Rutledge, G. C.; Hatton, T. A.; IUPAC World Polymer Congress, Blacksburg, VA, June 2012.

- Poster Prese Free-Standing Electrospun Carbon Nanofiber Webs for Electrochemical Sensing Applications **Mao, X.**; Simeon, F.; Rutledge, G. C.; Hatton, T. A.; MIT PPST Polymer Day, Cambridge, MA, March 2012.

- Redox-Responsive Polymeric Gels for Electrochemically Mediated Organics-Water Separation **Mao, X.**; Akhoury, A.; Rutledge, G. C.; Hatton, T. A.; MIT DMA Annual Meeting, Cambridge, MA, May 2011.

JOURNAL REVIEWING