

## CURRICULUM VITAE

**Haiqing Lin, Ph.D., Professor**

Department of Chemical and Biological Engineering  
University at Buffalo (UB), The State University of New York (SUNY)  
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Web: [www.cbe.buffalo.edu/lin](http://www.cbe.buffalo.edu/lin)

### EDUCATION:

- 2005 Ph.D. Chemical Engineering The University of Texas at Austin
- 2001 M.S. Chemical Engineering North Carolina State University
- 1999 M.S. Chemical Engineering Xiamen University, P.R. China
- 1996 B.S. Chemical Engineering Xiamen University, P.R. China

### PROFESSIONAL EXPERIENCE:

- Aug. 2021 – present Professor, University at Buffalo, SUNY
- Aug. 2018 – Jul. 2021 Associate Professor, University at Buffalo, SUNY
- Aug. 2013 – Jul. 2018 Assistant Professor, University at Buffalo, SUNY
- Sep. 2005 – Jul. 2013 Senior Research Engineer and Team Leader, Membrane Technology and Research, Inc. (MTR), Newark, CA

### MAJOR RESEARCH INTERESTS

- Advanced membranes for gas separations such as carbon capture
- Advanced membranes for water purification
- Small molecular transport in polymeric materials
- Structure/property relationship of polymer-based materials

### ACADEMIC AWARDS / SCHOLARSHIPS

- 2022 SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities
- 2021 Exceptional Scholar: Sustained Achievement Award, University at Buffalo
- 2021 Buffalo Blue Sky Gold Coin, University at Buffalo
- 2020 AIChE Separation Division Innovation Award
- 2019 Buffalo Blue Sky Gold Coin, University at Buffalo
- 2016 CAREER Award, National Science Foundation
- 2015 SEAS Early Career Researcher of the Year Award, University at Buffalo
- 2011 Distinguished Alumni Award, Chemical Engineering of Xiamen University
- 2006 University of Texas CO-OP Research Excellence Award for Best Research Paper
- 2006 AIChE Separation Division Graduate Student Research Award
- 1999 DuPont Fellowship, Xiamen University

### HONORS

- Specialty Chief Editor of *Frontiers in Environmental Chemistry*
- Editorial board member of *Journal of Polymer Science, Journal of Membrane Science Letters, Scientific Reports, Membranes, and Carbon Capture Science and Technology*
- 2020 I&EC Research Excellence in Review Awards
- 2020 Contributor to *Future Series* of AIChE Journal

- 2017 I&EC Research Excellence in Review Awards

## **AWARDS OF GRADUATE STUDENTS AND POSTDOCTORAL RESEARCHERS**

### 2021:

- Vinh Bui: Elias Klein traveling award from NAMS
- Xiaoyi Chen: ACS I&EC Division Graduate Student Award Symposium

### 2020:

- Xiaoyi Chen: Women in Chemical Engineering (WIC) Travel Award of AIChE
- Talieh Alebrahim: Elias Klein traveling award from NAMS;
- Talieh Alebrahim: Women in Chemical Engineering (WIC) Travel Award of AIChE
- Thien Tran: Graduate Research Award of Membranes of AIChE Separation Division

### 2019:

- Liang Huang: Young Investigator Fellowship from NAMS
- Junyi Liu: Graduate Research Award of Membranes of AIChE Separation Division
- Thien Tran: Student Speaker Award by the CBE Department
- Hien Nguyen: First Prize Poster Award of Separation Division at AIChE
- Hien Nguyen: First Prize Poster Award at Graduate Research Symposium of CBE
- Xiaoyi Chen: Elias Klein traveling award from NAMS

### 2018:

- Lingxiang Zhu: Chinese Government Award for Outstanding Self-financed Students Abroad
- Lingxiang Zhu: Graduate Research Award of Membranes of AIChE Separation Division
- Lingxiang Zhu: Student Fellowship from NAMS
- Lingxiang Zhu: Dean's Graduate Achievement Award from UB
- Nima Shahkaramipour: First Prize Poster Award at NAMS
- Nima Shahkaramipour: First Prize Poster Award at Graduate Research Symposium of CBE
- Nima Shahkaramipour: A&WMA Student Award
- Junyi Liu: Student Speaker Award by the CBE Department
- Thien (James) Tran: Finalist of ACS Graduate Research Award of PMSE
- Hien Nguyen: Third Prize Poster Award from NAMS
- Hien Nguyen: Elias Klein traveling award from NAMS

### 2017:

- Lingxiang Zhu: Finalist of AIChE Graduate Research Award of Polymers
- Lingxiang Zhu: Student Speaker Award by the CBE Department
- Milad Yavari: Air & Waste Management Association (A&WMA) Scholarship
- Junyi Liu: Student Speaker Award by the CBE Department
- Thien (James) Tran: Elias Klein traveling award from NAMS

### 2016:

- Nima Shahkaramipour: 2<sup>nd</sup> place NY P2I Student Competition by Pollution Prevention Program
- Nima Shahkaramipour: Elias Klein traveling award from NAMS

### 2015:

- Lingxiang Zhu: Elias Klein traveling award from NAMS

## **PROFESSIONAL MEMBERSHIPS AND ACTIVITIES**

- Board member of North American Membrane Society (NAMS) (2020-2023)
- Director of Separation Division of AIChE (2019 – 2024)
- Vice-chair and chair of Membranes Area of Separation Division of AIChE (2015 – 2019)
- American Association for the Advancement of Science (AAAS), Member
- American Chemical Society (ACS), Member
- American Institute of Chemical Engineers (AIChE), Senior Member
- American Physics Society (APS), Member
- Materials Research Society (MRS), Member
- North American Membrane Society (NAMS), Member

### **UNIVERSITY SERVICES**

- Member, Faculty Search Committee for Chemistry, September 2018 – April 2019
- Member, Faculty Search Committee for RENEW, September 2016 – April 2017

### **SCHOOL COMMITTEES**

- Member, Tenure and Promotion Committee, September 2018 – 2021
- Member, Academic grievance, September 2015 - present

### **DEPARTMENT COMMITTEES**

- Direct of Graduate Study, January 1, 2022 - present
- Member, Graduate Study Committee, September 2018 – present
- Member, Faculty Search Committee, September 2015 – April 2017
- Member, Faculty Search Committee, September 2015 – April 2017
- Member, Undergraduate Study Committee, September 2014 – August 2018
- Member, Annual Graduate Research Symposium, September 2013 – July 2018

### **PROFESSIONAL SERVICES**

#### Editor and Symposium Organizer

- Editor of Scientific Reports (2016-present)
- Associate Editor of Journal of Membrane Science and Research (2018 – present)
- Editorial board member of Journal of Membrane Science Letter (2021-present)
- Editorial board member of Journal of Polymer Science (2021-present)
- Editorial board member of Membranes (2020-present)
- Editorial board member of Advances in Polymer Technology (2018-present)
- Editorial board member of Heliyon (2018-2020)
- Editor of Frontiers in Environmental Chemistry (2020- present)
- Guest editor of a special issue entitled “Polymeric Membranes: Chemistry, Physics, and Applications” for *Journal of Polymer Science* (2020)
- Guest editor of a special issue entitled “Polymeric Membranes for Gas Separation” for *Membranes* (2018)
- Symposium organizer of ACS Pacifichem “Polymeric, inorganic, and hybrid materials for breakthrough membrane applications: advancing the science, engineering and process design” (December 2021)
- Symposium co-organizer of MRS Advanced Membranes for Energy-efficient Molecular Separation and Ion Conduction (November 2019)
- Symposium co-organizer of MRS Functional Nanostructured Polymers for Emerging Energy Technologies (November 2016)

- Symposium co-organizer of ACS Polymeric Materials Science and Engineering (PMSE) “Nanostructured Porous Polymers: Synthesis, Property, and Function” (March 2015)

#### Journal Reviewer (>50 manuscripts per year)

Accounts of Chemical Research; ACS Applied Materials and Interfaces; ACS Applied Polymers; ACS Macro Letters; ACS Nano; Advanced Functional Materials; Advanced Materials; AIChE Journal; Chemistry of Materials; Energy & Environmental Science, Industrial & Engineering Chemistry Research; Journal of Materials Chemistry A; Journal of Membrane Science; Journal of Polymer Science; Macromolecules; Membranes; Nano Letter; Nature Communications; Polymer; Progress in Polymer Science; Science; Science Advances

#### Proposal Reviewer

- NSF Review Panel (2014 - 2021)
- ACS Petroleum Research Fund Program (2014-2020)
- DOE ARPA-E (2020); SBIR (2019, 2021); LANL (2021); EERE (2007, 2009)
- University of Wisconsin-Milwaukee Research Foundation (2018, 2020, 2021)
- UK EPSRC Program (2014-2017)
- Israel Science Foundation and Agricultural Research and Development Fund (2013, 2017 - 2020)
- Czech Science Foundation (2018 - 2021)
- Singapore A\*STAR (2021)

#### **COURSES TAUGHT**

- CE540 Materials Principles (Fall), 30-50 graduate: 2017 - present
- CE318 Heat and Mass Transfer (Spring), 60 - 90 undergraduates: 2014 - 2020
- CE500 Materials Characterization (Fall), 20-40 graduate: 2014 - 2016

#### **RESEARCH SUPERVISION**

##### Prior Advisees

- Postdocs (2): *Wenji Guo (female)* (China), Liang Huang (Huazhong University of Science and Technology)
- Ph.D. students (8): *Xiaoyi Chen (female)*, (August 2021, Bolt Threads); Hien Nguyen (May 2020, Repligen Corporation); Thien Tran (May 2020, Postdoc at UB); Nima Shahkaramipour (December 2019, Pentair); *Maryam Omidvar (female)* (May 2019, Technical University of Denmark); Junyi Liu (December 2018, Air Liquide); Milad Yavari (December 2017, SRI International); Lingxiang Zhu (December 2017, DOE National Energy Technology Laboratory)
- M.S. students (26): Nicholas Rawda (VanDeMark Chemical), Skye Schaefer (Air Liquide), Sankhajit Pal (Intel), *Krista Clark (female)* (Pall), *Alisa Chakraborty (female)* (PhD at Penn State), Himangshu Mondal (PhD at Alabama), *Xiao-Ci Lin (female)*, Darius Rub (Thermal Fisher Scientific), Erda Deng (PhD at UB), *Riliwan Sanni (African American)* (Energy Materials Corporation), *Janavi Gohil (female)* (Pall), Sarthak Doshi (Cytiva), Gengyi Zhang (PhD at UB), Weiguang Jia (BiopepTek), *Shabdiki Chaurasia (female)* (UMass, Lowell), *Xiaoyi Chen (female)* (Bolt Threads), *Haley Valentine (female)* (Thermo Fisher Scientific), Praphulla Mandadapu (India), *Yichen Tu (female)* (Intel), Sankara Ramanan (Dynatemp Refrigerants Company), Nachiket Paranjape (Yahoo), Xianda Hou (Daqing Pure Hemp Technology Corp.),

Junyi Liu (Air Liquide), Shawreen Shah (Akorn), Benjamin Lam (Helios-NRG), and Shizhong Zhao (BiopepTek)

- Undergraduate Researchers (48): *Elizabeth Haddad (female)* (2022); *Elizabeth Jacobia (female)* (2021); Vinh Bu, Nicholas Rawda, and Skye Schaefer (2020); Vinh Bu, *Wilhemina Duah (female)*, Zhihao Feng, *Sarah Howard (female)*, Mohamed Kawy, Robert Kirisits, Omran Omar, Darius Rub, and Skye Schaefer (2019); *Tanahiry Escamilla (female)*, Suting Huang, Zhihao Feng, Chen Lin, Mohamed Kawy, and Omran Omar (2018); *Stephanie Hall (female)*, Suting Huang, Mingi Ji, *Fleurie Kelley (female)*, Chen Lin, and Yash Savla (2017); *Jennifer Park (female)*; Hunter Steven; *Sumbal Zaman (female)*; *Tanahiry Escamilla (female)*; *Beatrices Bacolod (female)*; and Chris Chan (2016); Ananthan Balachandran; Kaipin Huang; James Kim; Tho Le; John Schneible; Brandon Chin; Ryan Fair; Ken He; *Azza Hosny (female)*; Tony Huynh; *Vivian Huyhn (female)*; and Norman Ng (2015); and Po-Han Chen; *Dana Havas (female)*; Weiguang Jia; and Min Wei (2014)

### **Current Advisees**

- Postdocs (2): Thien Tran, Leiqing Hu
- Ph.D. students (8): Fathy Attia, *Taliehsadat Alebrahim (female)*, Vinh Bui, Sagnik Das, Erda Deng, *Narjes Esmaeili (female)*, Ameya Tandel, and Gengyi Zhang
- M.S. students (5): *Shweta Singh (female)*, Manas Agarwal, Kai Chen, Varun Reddy Satti, and *Mengqi Yuan (female)*
- Undergraduate researcher (1): Chintan Shah

### **GRANTS AND CONTRACTS AT UB**

To date (January 2023), Prof. Lin has secured more than **\$15 M** for his laboratory from federal, state, industrial, and international funding agencies. His laboratory has been involved with various projects with total awards of **≈\$26 M**.

### **As PI of Federal Grants and Contracts**

1. Catalytic Membrane Reactors Based on Carbon Molecular Sieve Hollow Fiber Membranes for Sustainable and Modular H<sub>2</sub> Production, PI: Haiqing Lin, 10/1/2022 – 9/30/2024, Department of Energy National Energy Technology Laboratory and Empire State Development Division of Science, Technology & Innovation (NYSTAR), \$2,100,000 (35% share)
2. Tunable Two-Dimensional (2D) Porous Material/Polymer Composite Hollow Fiber Membranes for Advanced Water Resource Recovery, PI: Haiqing Lin, 9/1/2021 – 8/31/2024, Department of Energy, Office of Energy Efficient & Renewable Energy, \$2,000,000 (20% share)
3. PFI-TT: Development of Polymeric Organosilica Membranes for Hydrogen Purification at 100 – 300 °C, PI: Haiqing Lin, 1/1/2021 – 12/31/2022, National Science Foundation, \$249,998 (95% share)
4. Membrane Adsorbents Comprising Self-Assembled Inorganic Nanocages (SINCs) for Super-fast Direct Air Capture Enabled by Passive Cooling, PI: Haiqing Lin, 10/1/2020 – 12/31/2022, Department of Energy National Energy Technology Laboratory, \$800,000 (35% share)
5. Rational Development of Novel Metal-Organic Polyhedra-based Membranes for CO<sub>2</sub> Capture, PI: Haiqing Lin, Co-PIs: Tim Cook, Tim Merkel, Andrew Sexton, Chulsung

- Bae, and Zhen-Gang Wang, 7/1/2019 – 6/30/2024; Department of Energy National Energy Technology Laboratory, \$2,857,557 (25% share)
6. Rational Development of Novel Metal-Organic Polyhedra-based Membranes for CO<sub>2</sub> Capture, PI: Haiqing Lin, Co-PI: Tim Cook, 7/1/2019 – 6/30/2024; Empire State Development Division of Science, Technology & Innovation (NYSTAR) \$599,999 (50% share)
  7. Development of ultrahigh-flux hollow fiber membranes based on carbon molecular sieve with superior H<sub>2</sub>/CO<sub>2</sub> separation properties, PI: Haiqing Lin, Co-PIs: Andrew Sexton and Raj Singh, 10/1/2018 – 12/31/2021; Department of Energy National Energy Technology Laboratory, \$800,000 (67% share)
  8. CAREER: SusChEM: Design and Discovery of Polymers with Pendant Rings for Membrane Gas Separations, PI: Haiqing Lin, 3/1/16-2/28/22, National Science Foundation (1554236), \$500,000 (100% share)
  9. Collaborative Research: SusChEM: Molecular Design of Durable Lewis Basic Elastomeric Membranes for Clean Energy Conversion and CO<sub>2</sub> Separation, PI: Haiqing Lin, 7/1/15 - 6/30/19, National Science Foundation (1506211), \$180,102 (100% share)
  10. AOI [1L2] Sorption Enhanced Mixed Matrix Membranes for CO<sub>2</sub> Capture from Precombustion Processes, PI: Haiqing Lin, Co-PI: Mark Swihart and Tim Merkel, 10/1/15 - 12/31/19, DOE NETL, \$1,470,099 (50% share)

#### **As PI at UB for Federal Grants and Contracts**

1. Engineering-Scale Testing and Validation of Algae-Based Technology and Bi-Products, PI: Haiqing Lin, 10/1/2021 – 9/30/2024, Department of Energy and Helios-NRG, \$2,000,000 (\$200,000 share)
2. CO<sub>2</sub>-philic Block Copolymers with Intrinsic Microporosity (BCPIMs) for Postcombustion CO<sub>2</sub> Capture, PI: Ravi Prasad, Co-PI: Haiqing Lin, 9/1/2021 – 8/31/2023, Department of Energy STTR Phase II Program through Helios-NRG, \$1,500,000 (\$500,000 share)
3. Novel Algae Technology to Utilize CO<sub>2</sub> for Value Added Products, PI: Ravi Prasad, Co-PI: Haiqing Lin, 7/1/2019 – 6/30/2022, Department of Energy National Energy Technology Laboratory through Helios-NRG (DE-FE-0031710), \$1,499,558 (\$200,000 share)
4. Development of Self-Assembly Isoporous Supports Enabling Transformational Membrane Performance for Cost-Effective Carbon Capture, PI: Hans Wijmans, Co-PIs: Haiqing Lin, 4/1/18 – 10/31/22; Department of Energy National Energy Technology Laboratory, \$2,907,219 (\$377,938 share)
5. CO<sub>2</sub>-philic Block Copolymers with Intrinsic Microporosity (BCPIMs) for Postcombustion CO<sub>2</sub> Capture, PI: Ravi Prasad, Co-PI: Haiqing Lin, 6/29/2020 – 7/28/2021, Department of Energy STTR Phase I Program through Helios-NRG (DE-SC0020730), \$256,420 (\$150,000 share)
6. Novel Algae Technology for CO<sub>2</sub> Utilization, PI: Ravi Prasad, Co-PI: Haiqing Lin, 5/20/21–12/31/20, DOE SBIR Phase II, \$1,000,000 (\$200,000 share)
7. Scalable Polymerized Metal-Organic Frameworks with CO<sub>2</sub>-philic Rubbery Polymers for Membrane CO<sub>2</sub>/N<sub>2</sub> Separation, PI: Ravi Prasad, Co-PI: Haiqing Lin, 7/2/18 – 4/1/19, DOE STTR Phase I, \$150,000 (\$75,000 share)
8. Novel Algae Technology for CO<sub>2</sub> Utilization, PI: Ravi Prasad, Co-PI: Haiqing Lin, 2/21/17–11/20/17, DOE SBIR Phase I, \$150,000 (\$45,000 share)

9. Novel Integrated Technology Incorporating Anti-fouling Membranes to Dewater Algal Harvests, PI: Ravi Prasad, Co-PI: Haiqing Lin, 6/8/15 - 3/7/16, DOE SBIR Phase I, \$150,000 (\$45,000)
10. Advanced Membrane Technology for Helium Recovery, PI: Ravi Prasad, Co-PI: Haiqing Lin, 4/1/14 - 3/31/15, DOE SBIR Phase 2, \$1,000,000 (\$10,000 share)

#### **As co-PI at UB for Federal Grants and Contracts**

1. Technologies for One Water in Extremely Resilient-buildings (TOWER), PI: Diana Aga, Co-PI: Martha Bohm, Ning Dai, and Haiqing Lin, 11/1/2022 – 10/31/2025, National Science Foundation, \$1,500,000 (\$375,000 share)
2. Manufacturing USA: GOALI: Designing Catalytic Membrane Reactors (CMRs) for Low-Temperature CO<sub>2</sub> Utilization and Methane Dry Reforming, PI: Mark Swihart, Co-PI: Haiqing Lin, Carl Lund, and Shiguang Li, 9/1/18-8/31/21, National Science Foundation (1804996), \$360,000 (\$120,000 share)
3. Laser Chip Lithography-Patterned Nanomembranes for Wastewater Treatment, PI: Liang Feng, Co-PI: Haiqing Lin, 9/1/16-8/31/20, National Science Foundation (1635026), \$250,000 (\$87,000 share)
4. Innovative Seawater Desalination Systems Coupling Peroxide Oxidation and Reactive Graphene Oxide Modified Membranes, PI: Ning Dai, Co-PI: Haiqing Lin, 3/1/18 – 8/31/19, Department of Interior (R17AC00147), \$150,000 (\$75,000 share)
5. Nanoporous Membranes Based on Sub-Nanometer Pores, PI: Bing Gong, Co-PI: Haiqing Lin, 6/15/15-5/31/19, National Science Foundation (1512164), \$300,000 (\$45,000 share)

#### **Industries and Internal Agencies**

1. Evaluation of anti-fouling membranes, PI: Haiqing Lin, 9/1/2021 – 8/31/2022, Rochester Institute of Technology, \$9,484
2. Nanofiltration membranes for Li recovery, PI: Haiqing Lin, 12/5/14 – 6/5/15, FMC, \$3,600 (100% share)
3. Membrane Testing for Lubrizol, PI: Haiqing Lin, 12/5/14 – 6/5/15, Lubrizol, \$8,995 (100% share)
4. Study of Chlorine Adsorption in Scrubber Bed Material, PI: Mark Swihart, Co-PI: Haiqing Lin, 8/1/14-10/31/14, AVOX Systems, \$13,972 ((\$6,986 share))
5. Stable Ultrathin Film Composite Membranes with High CO<sub>2</sub> Flux, PI: Haiqing Lin, 6/1/14 - 5/31/17, Korea Carbon Capture and Sequestration R&D Center, \$400,000 (100% share)

#### **New York State, SUNY, and UB Internal Funding**

1. Rational Design of Mixed Matrix Membranes for the Production of Blue and Green Hydrogen, PI: Haiqing Lin, Co-PI: Mark Swihart, 10/1/2021 – 7/31/2022, University at Buffalo, \$49,997 (\$24,999 share)
2. Facile fabrication of high performance membranes for industrial gas separations, PI: Haiqing Lin, 2/1/2021 – 10/31/2021, University at Buffalo Technology Accelerator Program, \$66,000 (100% share)
3. Advanced materials for carbon utilization, PI: Nirupam Aich, Co-PIs: Haiqing Lin and Gang Wu, 2/1/2021 – 1/31/2023, Buffalo Blue Sky by University at Buffalo, \$45,000 (\$20,000 share)
3. Molecular-level design of conductive polymer electrolytes for electrochemical energy storage, PI: Tim Cook, Co-PIs: Haiqing Lin and Javid Rzayev, 6/13/19 – 6/30/21, Buffalo Blue Sky by University at Buffalo, \$45,000 (\$20,000 share)

4. Rational Development of Robust Membranes for Nitrate Removal from Wastewater, PI: Haiqing Lin, Co-PI: Jeffrey Errington, 10/1/17 – 9/30/18, Stony Brook University, \$35,000 (\$17,500 share)
5. Mixed Matrix Membranes Comprising Polymers and Metal-Organic Polyhedra for Olefin/Paraffin Separation, PI: Tim Cook, Co-PI: Haiqing Lin, 1/15/17 – 1/14/18, UB IMPACT, \$32,000 (\$16,000 share)
6. Zero Energy Adaptive Façade (ZEAF) for Energy Efficient Buildings, PI: Haiqing Lin, Co-PI: JinYoung Song and Jongmin Shim, 4/1/16-3/31/17, UB SMART, \$34,981 (\$11,660 share)
7. Isoporous Ultrafiltration Membranes by Self-Assembly of Block Copolymers for Water Purification, PI: Javid Rzayev, Co-PI: Haiqing Lin, 2/1/16-1/31/17, UB IMPACT, \$35,000 (\$17,500 share)
8. IMPACT: Robust Nanoscale-Patterned Membranes for Wastewater Treatment Using Laser Chips-Based Lithography, PI: Liang Feng, Co-PI: Haiqing Lin, 5/15/15 - 4/14/16, UB IMPACT, \$34,354 (\$11,451 share)
9. Development of Advanced Membrane Materials for Industrial Gas Separation and Water Reuse, PI: Haiqing Lin, 2/1/15 – 6/30/15, UB CMI, \$25,000 (100% share)
10. Nanostructured Membranes with Sub-Nanometer Channels for Energy Efficient Seawater Desalination and Food Processing, PI: Haiqing Lin, Co-PI: Bing Gong, 9/1/14 – 8/31/15, UB RENEW, \$25,300 (100% share)
11. Feasibility Study of Antifouling Membranes for Wastewater Reuse, PI: Haiqing Lin, Co-PI: Chong Cheng, 8/1/14 - 12/31/16, NY Pollution Prevention Program, \$93,925 (100% share)
12. Ultrathin High Flux Atomic Layer Deposited (ALD) Metal Membranes for Green H<sub>2</sub> Production, PI: Uttam Singiseti, Co-PI: Haiqing Lin and Qiaoqiang Gan, 4/1/14 - 3/31/15, UB IMPACT, \$34,947 (\$11,649 share)

#### **GRANT AND CONTRACT BEFORE UB**

16. California Energy Commission, Energy Innovations Small Grant Programs, “Prototype and Demonstration of Membrane Processes for Natural Gas Dehydration,” \$94,995, 1/2012-12/2012
15. DOE Small Business Innovation Program (SBIR) Phase II, “Advanced Membrane Technology for Helium Recovery,” \$67,000, 11/2011 – 9/10/13, [subcontractor to Helios-NRG (PI)]
14. EPA SBIR Phase II, “Novel Membrane Process to Utilize Dilute Methane Streams,” \$225,000, 5/2011 – 4/2013
13. DOE SBIR Phase I, “Novel Thermally Rearranged Polymers for Olefin-Paraffin Separations,” \$150,000, 6/2011 – 3/2012 (with University of Texas at Austin)
12. EPA SBIR Phase I, “Novel Membranes for Natural Gas Dehydration,” \$80,000, 3/2011 – 8/2011
11. DOE SBIR Phase III Xlerator program, “Field Demonstration of CO<sub>2</sub> Capture from Coal-Derived Syngas,” \$1,499,990, 9/2010 – 6/2013
10. DOE Industrial Technology Program Grand Challenge Project, “Novel Membrane and Processes for Oxygen Enrichment,” \$385,819, 8/2010 – 8/2011 (with Gas Technology Institute and Tetramer Technology)
9. EPA SBIR Phase I, “Novel Membrane Process to Utilize Dilute Methane Streams,” \$70,000, 3/2010 – 9/2010
8. EPA SBIR Phase I, “High Flux Membranes to Upgrade Biogas from Anaerobic Digesters,” \$70,000, 2/2009 – 7/2009



7. DOE SBIR Phase II, “Membrane System for Coal Bed CO<sub>2</sub> Sequestration and Methane Production,” \$750,000, 8/2008 – 7/2010
6. NSF SBIR Phase II, “New Synthesis Approach to High Performance, Low Cost CO<sub>2</sub>/CH<sub>4</sub> Gas Separation Membranes,” \$500,000, 2/2008 – 2/2010 (subcontract to Tetramer Technologies)
5. EPA SBIR Phase II, “A Membrane Pre-concentrator for Portable Trace VOC Detector,” \$225,000, 5/2007 – 4/2009
4. DOE NETL, “Membrane Process to Sequester CO<sub>2</sub> from Power Plant Flue Gas,” \$800,000, 4/2007 – 3/2009 (I participated in this project, which led to the second and third phases of the technology development with a total funding of \$20,000,000 from DOE)
3. DOE SBIR Phase I, “Energy-Efficient Process to Utilize Dilute Methane Emissions,” \$100,000, 9/2006 – 3/2007
2. EPA SBIR Phase I, “A Membrane Pre-concentrator for Portable Trace VOC Detector,” \$70,000, 2/2006 – 8/2006
1. DOE SBIR Phase II, “Stable Membranes for Separating Hydrogen Containing Petrochemical and Refinery Stream,” \$750,000, 7/2005 – 7/2007

## **PUBLICATIONS**

- Google Scholar Citation of 9323 in total; H-index: 44; i10-index: 97 (1/18/2023)
- Link: <https://scholar.google.com/citations?user=7cxhEhwAAAAJ&hl=en>
- ORCID: <https://orcid.org/0000-0001-8042-154X>

## **Patents and Applications**

10. L. Zhu, L. Huang, M.T. Swihart, and H. Lin, “Organosilica membrane compositions, devices comprising such membranes, and methods for making and using” Patent Application, No. 62/962,809 (January 17, 2021)
9. J. Rzayev, J. Mapas, and H. Lin, “Ultrahigh Molecular Weight Block Copolymers and Polymers, Methods of Making Same, and Uses of Same”, US Patent Application 20200062882A1 (May 4, 2018), and WO Patent Application PCT/US2018/031215 (May 4, 2018)
8. N.P. Wynn, H. Lin, A. M. Zhou, J. Ly, and T. C. Merkel, “Low-energy process to produce oxygen-enriched air using membrane technology,” US Patent Application 13/439,716 (April 1, 2012), Publication US20130263734A1.
7. N.P. Wynn, H. Lin, M. Zhou, J. Ly, A. Serbanescu-Martin, “Membrane-Based Gas Separation Process Using Ejector-Driven Gas Recycle,” US Patent Number 9,017,451 B2 (April 28, 2015).
6. N.P. Wynn, S. Thomas-Doz, M. Zhou, J. He, and H. Lin, “Process for the Production of Methanol Including Two Membrane Separation Steps,” US Patent Number 8,623,926 B2 (January 7, 2014).
5. N.P. Wynn, D.E. Gottschlich, and H. Lin, “Gas separation process for production of hydrogen by autothermal reforming of natural gas, with carbon dioxide recovery,” US Patent 8,771,637 B2 (July 8, 2014).
4. J.G. Wijmans, T.C. Merkel, H. Lin, S. Thompson, and R. Daniels, “Efficient gas separation process to upgrade dilute methane stream for use as fuel,” US Patent 8,128,733 B2 (March 6, 2012).
3. R.W. Baker, J.G. Wijmans, T.C. Merkel, H. Lin, R. Daniels, and S. Thompson, “Combustion systems, power plants, and flue gas treatment systems incorporating sweep-based membrane separation units to remove carbon dioxide from combustion gases,” US Patent 8,016,923 B2 (September 13, 2011).

2. R.W. Baker, J.G. Wijmans, T.C. Merkel, H. Lin, R. Daniels, and S. Thompson, "Gas separation processes using membranes with permeate sweep to remove CO<sub>2</sub> from combustion gases," US Patent 7,964,020 B2 (June 21, 2011).
1. B.D. Freeman, S. Matteucci, and H. Lin, "Metal oxide nanoparticle filled polymers," U.S. Patent 7,510,595 B2 (March 31, 2009), International Publication Number WO 2007/084169 A2.

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### **Book Chapters**

7. X. Chen, F. Shi, D. Hopkinson, H. Lin, and S. Yi, Membrane Technologies and Applications to Produced Water Treatment, *Solid-Liquid Separation Technologies*, CRC Press, (2022)
6. X. Hou, J. Liu, H. Nguyen, and H. Lin, "Doping Polymers with Ionic Liquids to Manipulate Morphology and Membrane Gas Separation Properties," in *Polymerized Ionic Liquids*, Edited by A. Eftekhari, Royal Society of Chemistry, 262-279 (2018)
5. L. Zhu, M. Omid, and H. Lin, "Manipulating Polyimide Nanostructures via Cross-linking for Membrane Gas Separation," in *Membranes for Gas Separation*, Edited by M. A. Carreon, World Scientific, Volume 1, 243-270 (2017).
4. H. Lin, "Permeability," "Photopolymerization," and "Crosslinked poly(ethylene oxide)," in *Encyclopedia of Membrane*, edited by E. Drioli and L. Giomo, Springer Berlin (2016).
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2. V.A. Kusuma, H. Lin, B.D. Freeman, M. Yose-Yacaman, S. Kalakkunnath, and D.S. Kalika, "Structure/property characteristics of polar rubbery polymeric membranes

for carbon dioxide removal from mixtures with light gas,” in *Membranes: Manufacturing Utilizing Six Sigma and Applications*, edited by N.N. Li, A.G. Fane, W.S.W. Ho, and T. Matsuura, Wiley, New York, pp. 929-953 (2008).

1. H. Lin and B.D. Freeman, “Permeation and diffusion,” in *Springer-Handbook of Materials Measurement Methods*, edited by H. Czichos, L.E. Smith, and T. Saito, Springer, pp. 371-387 (2006).

#### **INVITED TECHNICAL PRESENTATIONS**

- 61.H. Lin, “Polyethers Beyond Poly(ethylene oxide) with Superior CO<sub>2</sub>/N<sub>2</sub> Separation Properties,” ACS Spring Conference, Chicago, IL, August 24, 2022
- 60.H. Lin, “Polyamines for Carbon Capture: The Obvious, The Unexpected, and The Puzzling,” Gordon Research Conference of Membranes: Materials and Processes, New London, NH, August 1, 2022
- 59.H. Lin, “Engineering Polymeric Membranes for Pre-Combustion Carbon Capture: Integrating Fundamental Discovery and Technology Impact,” Gordon Research Seminar of Membranes: Materials and Processes, New London, NH, July 30, 2022
58. H. Lin, “Metal Ion-Coordinated Supramolecular Polymer Networks for Post-combustion Carbon Capture,” International Conference on Carbon Capture Science and Technology, July 22, 2022
57. H. Lin, “Highly Flexible Poly(1,3-dioxolane)-Based Polymers with Superior CO<sub>2</sub>/N<sub>2</sub> Separation Properties,” The 11th Young Researcher Forum of Egypt, May 10, 2022
- 56.H. Lin, “Molecularly Engineering Polymeric Membranes for Carbon Capture.” Department Seminar, West Virginia University, WV, January 21, 2022
- 55.H. Lin, “Polybenzimidazole-based Membranes for Gas Separation,” Pentair, October 27, 2021
- 54.H. Lin, “Molecularly Engineering Polymeric Membranes for Carbon Capture,” SPT International Lectureship, October 20, 2021
- 53.H. Lin, “Scalable Polymeric Membranes for Carbon Capture,” Pentair, October 18, 2021
- 52.H. Lin, “Membrane Solutions to Clean Air and Clean Water,” Pall Corporation, March 25, 2021
- 51.H. Lin, “Highly Branched Polymers with High Ether Oxygen Content for Membrane CO<sub>2</sub>/N<sub>2</sub> Separation,” ICOM Meeting, December 9, 2020
- 50.H. Lin, “Molecularly engineering polymeric membranes for pre-combustion CO<sub>2</sub> capture at 150 °C and above,” AIChE Meeting, November 2020
- 49.H. Lin, “Few-nanometer thick organosilica membranes for high-temperature H<sub>2</sub>/CO<sub>2</sub> separation” Materials Science & Technology 2020 Technical Meeting, October 2020
- 48.H. Lin, “Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture,” Department Seminar, Michigan State University, September 25, 2019
- 47.H. Lin, “Refining Polybenzimidazole (PBI) for Membrane H<sub>2</sub>/CO<sub>2</sub> Separation,” Air Liquide, America, September 16, 2019
- 46.H. Lin, “Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture,” Hanyang University, South Korea, August 2, 2019
- 45.H. Lin, “Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture,” Department Seminar, Beijing University of Technology, China, July 18, 2019
- 44.H. Lin, “Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture,” Research Institute of Innovative Technology for the Earth (RITE), Japan, July 12, 2019

- 43.H. Lin, "Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture," Department Seminar, Kobe University, Japan, July 11, 2019
- 42.H. Lin, "Molecularly Engineered Sorption-enhanced Membrane Materials for CO<sub>2</sub> Capture," Department Seminar, Meiji University, Japan, July 9, 2019
- 41.H. Lin, "Designing Sorption-Enhanced Mixed Matrix Membranes for H<sub>2</sub>/CO<sub>2</sub> Separation Using an Integrated Experimental and Modeling Approach," AIChE Conference, Pittsburgh, PA, October 29, 2018
- 40.H. Lin, "Molecularly Engineering Membranes for Sorption-enhanced Gas Separation," Department Seminar, Beijing University of Chemical Technology, October 18, 2018
- 39.H. Lin, "Advanced Membranes for Water Reuse and Algae Dewatering," Department Seminar, Beijing Union University, October 17, 2018
- 38.H. Lin, "Molecularly Engineering Membranes for Sorption-enhanced Gas Separation," Department Seminar, North China Electric Power University, China, October 16, 2018
- 37.H. Lin, "Sorption-enhanced mixed matrix membranes for pre-combustion CO<sub>2</sub> capture," Clearwater Clean Energy Conference, Clearwater, FL, June 4, 2018
- 36.H. Lin, "Effect of membrane surface chemistry on water permeance and antifouling properties," ACS Spring meeting, New Orleans, LA, March 19, 2018
- 35.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical Engineering, University of Cincinnati, March 2, 2018
- 34.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical Engineering, University of Waterloo, January 18, 2018
- 33.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical Engineering, Zhejiang University, December 2017
- 32.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical Engineering, Tianjin University, December 2017
- 31.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical Engineering, Tianjin Polytechnic University, December 2017
- 30.H. Lin, "Molecularly Engineering of Membrane Materials for Separations through Enhanced Interactions: A Road Less Traveled," Department Seminar, Department of Chemical and Materials Engineering, University of Kentucky, March 1, 2017
- 29.H. Lin, "Facile Grafting of Zwitterions onto Membrane Surface to Improve Antifouling Properties for Wastewater Reuse," ACS Spring, San Francisco, CA, April 6, 2017
- 28.H. Lin, "Molecularly Engineering Polymeric Materials with Enhanced Gas Sorption for Membrane CO<sub>2</sub> Capture," Department Seminar, Department of Chemical Engineering, University of Rochester, October 5, 2016
- 27.H. Lin, L. Zhu, J. Liu and B. Lam, "Polymeric Membranes for CO<sub>2</sub> Separation," American Chemical Society PacificChem, Honolulu, HI, December 17, 2015
- 26.H. Lin, "Impregnated Membranes for Water Purification by Forward Osmosis," The 8th Sino-US Chemical Engineering Conference, Shanghai, China, October 2015
- 25.H. Lin, "Designing functional molecules for CO<sub>2</sub> Sorption," Praxair Inc., Buffalo, NY, September 29, 2015
- 24.H. Lin, "Development of Membranes for H<sub>2</sub> Purification and CO<sub>2</sub> Capture: From Material Molecular Engineering to Technology Commercialization," Invited

- presentation at the Fourth EITA Young Investigator Conference, Boston, MA, August 27, 2015
23. H. Lin, M. Yavari and L. Zhu, "Integrated Membrane Materials and Process Development for Gas Separation," Conference of American Institute of Chemical Engineering (AIChE), Atlanta, GA, November 17, 2014
  22. H. Lin, "Advances in Membrane Technology for Water Treatment," Department Seminar, Department of Civil, Structure and Environmental Engineering, University at Buffalo, December 4, 2014
  21. H. Lin, "Development of Membranes for H<sub>2</sub> Purification and CO<sub>2</sub> Capture: From Material Molecular Engineering to Technology Commercialization," Department Seminar, Department of Chemical and Biomolecular Engineering, Ohio State University, September 25, 2014
  20. H. Lin, "Membrane Processes and Economics for Industrial Gas Separation," Praxair Inc., Buffalo, NY, March 19, 2014
  19. H. Lin, R. Daniels, T. Merkel and J. Wijmans, "Dilute Methane Utilization Using A Membrane Gas Exchanger," AIChE Conference, San Francisco, CA, November 4, 2013
  18. H. Lin, "Understanding the Practical Upper Bound for CO<sub>2</sub>/CH<sub>4</sub> Separation Using Polymeric Membranes," The 7th Sino-US Chemical Engineering Conference, Beijing, China, October 15, 2013
  17. H. Lin, "Understanding the Practical Upper bound for CO<sub>2</sub>/CH<sub>4</sub> Separation," *The 7th Sino-US Joint Chemical Engineering Conference*, Beijing, China, October 15, 2013.
  16. H. Lin, "Development of Membranes for H<sub>2</sub> Purification and CO<sub>2</sub> Capture: From Material Molecular Engineering to Technology Commercialization," Department Seminar, Department of Chemical and Biomolecular Engineering, Xiamen University, July 31, 2014
  15. H. Lin, "Membrane Development for Precombustion CO<sub>2</sub> Capture: From Molecular Engineering to Product Demonstration," Department Seminar, North China Electric Power University, China, October 17, 2013
  14. H. Lin, "Development of Membranes for H<sub>2</sub> Purification and CO<sub>2</sub> Capture: From Material Molecular Engineering to Technology Commercialization," Department Seminar, Tianjin University, China, October 14, 2013
  13. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," Auburn University, April 1, 2013 (*Interview*)
  12. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," University of Houston, March 1, 2013 (*Interview*)
  11. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," Clemson University, February 19, 2013 (*Interview*)
  10. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," University at Buffalo, SUNY, February 14, 2013 (*Interview*)
  9. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," North Carolina State University, February 12, 2013 (*Interview*)
  8. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," Pennsylvania State University, February 5, 2013 (*Interview*)
  7. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," Texas Tech University, January 28, 2013 (*Interview*)
  6. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," Drexel University, January 24, 2013 (*Interview*)
  5. H. Lin, "Molecular Engineering of Polymeric Membrane Materials for H<sub>2</sub> Purification and CO<sub>2</sub> Capture," University of Texas at Austin, January 17, 2013

4. H. Lin, A. Serbanescu-Martin, M. Zhou, and T.C. Merkel, "Oxygen Enrichment Using Membranes," *The 244<sup>th</sup> ACS National Conference*, Philadelphia, August 19, 2012.
3. H. Lin, T.C. Merkel, J. He, J. Kaschemekat, A. Ng, S. Pande, A. Serbanescu-Martin, S. Thomas-Droz, J. Vu, L.S. White, and M. Zhou, "Field Demonstration of CO<sub>2</sub> Capture from Coal-Derived Syngas," *The DOE Project Review Meeting at National Carbon Capture Center*, Wilsonville, AL, December 7, 2011.
2. H. Lin, A. Serbanescu-Martin, M. Zhou, and T.C. Merkel, "Understanding the Practical Upper bound for CO<sub>2</sub>/CH<sub>4</sub> Separation," *The 240<sup>th</sup> ACS National Conference*, Boston, August 25, 2010.
1. H. Lin, "Hydrogen Purification and CO<sub>2</sub> Sequestration Using Polymeric Membranes," *Golden Gate Polymer Forum Dinner Meeting*, Mountain View, CA, May 18, 2009.