

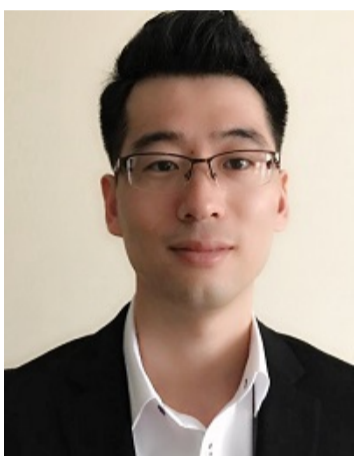


首页 学院概况 师资队伍 学科建设 科学研究 立德树人 党建工作 校友工作 招生工作 国际交流 诚聘英才 资料下载



## 韩刚

发布者: envadmin 发布时间: 2021-08-31 浏览次数: 23502



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### 教育背景

2009.08 – 2014.05 新加坡国立大学 (NUS), 化学与生物分子工程系, 获博士学位 (导师: Neal Chung Tai-Shung)

2004.09 – 2008.07 大连理工大学, 应用化学-精细化工专业, 获学士学位 (导师: 张淑芬)

### 科研教学经历

2021.07 – 至今 南开大学, 环境科学与工程学院, 教授, 博士生导师

2018.01 – 2021.04 美国麻省理工学院 (MIT), 化学工程系, 博士后研究员 (导师: Zachary P. Smith)

2017.01 – 2021.06 新加坡BlueOcean Memtech Pte Ltd, 高级技术顾问 (兼职)

2014.05 – 2017.12 新加坡国立大学 (NUS), 化学与生物分子工程系, 博士后研究员 (导师: Neal Chung Tai-Shung)

本课题组围绕物质在多孔介质中的传质过程展开, 以先进高分子材料和纳米介孔材料为基础, 以工程理念为指导, 专注于节能、高效分离器件和分离过程的设计与制备, 目标是解决化工、环保等领域重大分离挑战, 降低能耗和环境负荷。目前主要研究方向为膜分离, 以服务国家经济建设和社会发展为导向, 实现膜技术在碳中和、脱盐、废水处理、有机溶剂分离回收等应用中的高效强化。

课题组热忱欢迎对上述研究方向感兴趣, 具有环境、材料、化学化工等研究背景的老师、博士后和研究生加入! 课题组将努力为研究生提供赴美国、新加坡、澳大利亚、韩国知名高校联合培养或访问交流的机会。

### 学术与社会任职

2020 – 2021 Membranes, 客座编辑

2020 – 美国化学学会 (American Chemical Society, ACS) 会员

2020 北美膜协会 (The North American Membrane Society, NAMS) 年会学生海报奖评委

2019 – 美国化学工程学会 (American Institute of Chemical Engineers, AIChE) 会员

2019 – 北美膜协会 (The North American Membrane Society, NAMS) 会员

2014 – 2015 化学工程师协会 (Institution of Chemical Engineers, IChemE) 会员

任Nature Comm., J. Am. Chem. Soc., Angew. Chem. Int. Ed., Adv. Mater., Environ. Sci. Technol., Environ. Sci. Technol. Lett., Water Res., J. Membr. Sci.等学术期刊审稿人, 新加坡国家环境局(National Environment Agency, NEA)基金项目评审人。

### 科研项目

1. 南开大学百名青年学科带头人项目, 2021-2023。

2. “Purifying Water from Boron Contamination with Highly Selective Metal-Organic Framework (MOF) Membranes”, Abdul Latif Jameel Water & Food Systems Lab (J-WAFS) Seed Fund Program, 2018–2020.

3. “Synthesis and Characterization of Polymer-ZIF Hybrid Materials Using Post-Synthetic Modification”, ExxonMobil, 2019–2021.

4. “Membrane Development for Osmotic Power Generation, Part 1: Materials Development and Membrane Fabrication” (1102-IRIS-11-01), Singapore National Research Foundation (NRF) under its Environment and Water Research Programme, 2013–2017.

- “Membrane Development for Osmotic Power Generation, Part 2: Module Fabrication and System Integration” (1102-IRIS-11-02), Singapore National Research Foundation (NRF) under its Environment and Water Research Programme, 2015–2017.
- “Advanced FO Membranes and Membrane Systems for Wastewater Treatment, Water Reuse and Seawater Desalination”, Singapore National Research Foundation (NRF) under its Competitive Research Program, 2011–2015.

## 学术论著

至今在《Sci. Adv.》、《Angew. Chem.》、《Chem. Rev.》、《Prog. Polym. Sci.》、《Environ. Sci. Technol.》、《Water Res.》、《J. Membr. Sci.》等SCI期刊发表论文40余篇，受邀参编7部中英文著作，授权3项国际发明专利，论文列表和被引用情况：

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Web of Science (Publons): <https://publons.com/researcher/2236873/gang-han/>

Research Gate: <https://www.researchgate.net/profile/Han-Gang-3>

## 代表性期刊论文 (Selected journal publications)

- Yanqiu Zhang, Jing Guo, Gang Han, Yongping Bai, Qingchun Ge, Jun Ma, Cher Hon Lau, Lu Shao. Molecularly soldered covalent organic frameworks for ultrafast precision sieving. *Sci. Adv.* 7, eabe8706 (2021).
- Xu Jiang, Shanshan He, Gang Han, Jun Long, Songwei Li, Cher Hon Lau, Sui Zhang, Lu Shao. Aqueous one-step modulation for synthesizing monodispersed ZIF-8 nanocrystals for mixed-matrix membrane. *ACS Appl. Mater. Interfaces* 2021, 13, 9, 11296–11305.
- Katherine Mizrahi Rodriguez, Sharon Lin, Albert X. Wu, Gang Han, Justin J. Teesdale, Cara M. Doherty, Zachary P. Smith. Leveraging free volume manipulation to improve membrane separation performance of amine-functionalized PIM-1. *Angew. Chem. Int. Ed.* 60 (2021) 6593–6599.
- Jiangtao Liu#, Gang Han#, Dieling Zhao, Kangjia Lu, Jie Gao, Tai-Shung Chung. Self-standing and flexible covalent organic framework (COF) membranes for molecular separation. *Sci. Adv.* 2020, 6: eabb1110.
- Gang Han, Katherine Mizrahi Rodriguez, Qihui Qian, Zachary P. Smith. Acid-modulated synthesis of high surface area amine-functionalized MIL-101(Cr) nanoparticles for CO<sub>2</sub> separations. *Ind. Eng. Chem. Res.* 59 (2020) 18139–18150.
- Katherine Mizrahi Rodriguez, Albert X. Wu, Qihui Qian, Gang Han, Sharon Lin, Francesco M. Benedetti, Hyunhee Lee, Won Seok Chi, Cara M. Doherty, Zachary P. Smith. Facile and time-efficient carboxylic acid functionalization of PIM-1: Effect on molecular packing and gas separation performance. *Macromolecules* 53 (2020) 6220–6234.
- Qihui Qian, Patrick A. Asinger, Moon Joo Lee, Gang Han, Katherine Mizrahi Rodriguez, Sharon Lin, Francesco M. Benedetti, Albert X. Wu, Won Seok Chi, Zachary P. Smith. MOF-based membranes for gas separations. *Chem. Rev.* 120 (2020) 8161–8266.
- Charles Tai-Chieh Wan#, Diego Lopez Barreiro#, Antoni Forner-Cuenca, Jack-William Barotta, Morgan J. Hawker, Gang Han, Hyun-Chae Loh, Admir Masic, David L. Kaplan, Yet-Ming Chiang, Fikile R. Brushet, Francisco J. Martin-Martinez, Markus J. Buehler. Exploration of biomass-derived activated carbons for use in vanadium redox flow batteries. *ACS Sustainable Chem. Eng.* 8 (2020) 9472–9482.
- Gang Han, Qihui Qian, Katherine Mizrahi Rodriguez, Zachary P. Smith. Hydrothermal synthesis of sub-20 nm amine-functionalized MIL-101(Cr) nanoparticles with high surface area and enhanced CO<sub>2</sub> uptake. *Ind. Eng. Chem. Res.* 59 (2020) 7888–7900.
- Qihui Qian, Won Seok Chi, Gang Han, Smith P. Zachary. Impact of post-synthetic modification routes on filler structure and performance in metal-organic framework-based mixed-matrix membranes. *Ind. Eng. Chem. Res.* 59 (2020) 5432–5438.
- Dangchen Ma, Gang Han, Zhuo Fan Gao; Shing Bor Chen. Continuous UiO-66-type metal-organic framework thin film on polymeric support for organic solvent nanofiltration. *ACS Appl. Mater. Interfaces* 11 (2019) 45290–45300.
- Gang Han, Jiang Tao Liu, Kang Jia Lu, Tai-Shung Chung. Advanced anti-fouling membranes for osmotic power generation from wastewater via pressure retarded osmosis (PRO). *Environ. Sci. Technol.* 52 (2018) 6686–6694.
- Gang Han, Tai-Shung Chung, Martin Weber, Christian Maletzko. Low-pressure nanofiltration hollow fiber membranes for effective fractionation of dyes and inorganic salts in textile wastewater. *Environ. Sci. Technol.* 52 (2018) 3676–3684.
- Gang Han, Yingnan Feng, Tai-Shung Chung, Martin Weber, Christian Maletzko. Phase inversion directly induced tight ultrafiltration (UF) hollow fiber membranes for effective removal of textile dyes. *Environ. Sci. Technol.* 51 (2017) 14254–14261.
- Dangchen Ma, Shing Bo Peh, Gang Han\*, Shing Bor Chen\*. Thin-film nanocomposite (TFN) membranes incorporated with super-hydrophilic metal-organic framework (MOF) UiO-66: Towards enhancement of water flux and salt rejection. *ACS Appl. Mater. Interfaces* 9 (2017) 7523–7534.
- Gang Han, Zhen Lei Cheng, Tai-Shung Chung. Thin-film composite (TFC) hollow fiber membrane with double-polyamide active layers for internal concentration polarization and fouling mitigation in osmotic processes. *J. Membr. Sci.* 523 (2017) 497–504.
- Gang Han, Sun Sun Chan, Tai-Shung Chung. Forward osmosis (FO) for water reclamation from emulsified oil/water solutions: Effects of membrane and emulsion characteristics. *ACS Sustainable Chem. Eng.* 4 (2016) 5021–5032.
- Gang Han, Jieliang Zhou, Chunfeng Wan, Tianshi Yang, Tai-Shung Chung. Investigations of inorganic and organic fouling behaviors, antifouling and cleaning strategies for pressure retarded osmosis (PRO) membrane using seawater desalination brine and wastewater. *Water Res.* 103 (2016) 264–275.
- Gang Han, Can-Zeng Liang, Tai-Shung Chung, Martin Weber, Claudia Staudt, Christian Maletzko. Combination of forward osmosis (FO) process with coagulation/flocculation (CF) for potential treatment of textile wastewater. *Water Res.* 91 (2016) 361–370.
- Gang Han, Jos S. de Wit, Tai-Shung Chung. Water reclamation from emulsified oily wastewater via effective forward osmosis hollow fiber membranes under the PRO mode. *Water Res.* 81 (2015) 54–63.
- Gang Han, Sui Zhang, Xue Li, Tai-Shung Chung. Progress in pressure retarded osmosis (PRO) membranes for osmotic power generation. *Prog. Polym. Sci.* 51 (2015) 1–27.
- Gang Han, Baiwang Zhao, Fengjiang Fu, Tai-Shung Chung, Martin Weber, Claudia Staudt, Christian Maletzko. High performance thin-film composite membranes with mesh-reinforced hydrophilic sulfonated polyphenylenesulfone (sPPSU) substrates for osmotically driven processes. *J. Membr. Sci.* 502 (2016) 84–93.
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- Gang Han, Qingchun Ge, Tai-Shung Chung. Conceptual demonstration of novel closed-loop pressure retarded osmosis process for sustainable osmotic energy generation. *Appl. Energy.* 132 (2014) 383–393.
- Gang Han, Tai-Shung Chung. Robust and high performance pressure retarded osmosis hollow fiber membranes for osmotic power generation. *AIChE J.* 60 (2014) 1107–1119.
- Gang Han, Peng Wang, Tai-Shung Chung. Highly robust thin-film composite pressure retarded osmosis (PRO) hollow fiber membranes with high power densities for renewable salinity-gradient energy generation. *Environ. Sci. Technol.* 47 (2013) 8070–8077.
- Gang Han, Sui Zhang, Xue Li, Tai-Shung Chung. High performance thin film composite pressure retarded osmosis (PRO) membranes for renewable salinity-gradient energy generation. *J. Membr. Sci.* 440 (2013) 108–121.
- Gang Han, Tai-Shung Chung, Masahiro Toriida, Shoji Tamai. Thin-film composite forward osmosis membranes with novel hydrophilic supports for desalination. *J. Membr. Sci.* 423–424 (2012) 543–555.
- Gang Han, Sui Zhang, Xue Li, Natalia Widjojo, Tai-Shung Chung. Thin film composite forward osmosis membranes based on polydopamine modified polysulfone substrates with enhancements in both water flux and salt rejection. *Chem. Eng. Sci.* 80 (2012) 219–231.
- Yingran He, Jiangtao Liu, Gang Han, Tai-Shung Chung. Novel thin-film composite nanofiltration membranes consisting of a zwitterionic co-polymer for selenium and arsenic removal. *J. Membr. Sci.* 555 (2018) 299–306.

31. Dangchen Ma, Gang Han, Shing Bo Peh, Shing Bor Chen. Water-stable metal-organic framework UiO-66 for performance enhancement of forward osmosis membranes. *Ind. Eng. Chem. Res.* 56 (2017) 12773–12782.
32. Yingnan Feng, Gang Han, Tai-Shung Chung, Martin Weber, Natalia Widjojo, Christian Maletzko. Effects of polyethylene glycol on the membrane formation and properties of hydrophilic sulfonated polyphenylenesulfone (sPPSU) membranes. *J. Membr. Sci.* 531 (2017) 27–35.
33. Qingchun Ge, Gang Han, Tai-Shung Chung. Effective As(III) removal by a multi-charged hydroacid complex draw solute facilitated forward osmosis-membrane distillation (FO-MD) processes. *Environ. Sci. Technol.* 50 (2016) 2363–2370.
34. Yingnan Feng, Gang Han, Liling Zhang, Shing-Bor Chen, Tai-Shung Chung, Martin Weber, Claudia Staudt, Christian Maletzko. Rheology and phase inversion behavior of polyphenylenesulfone (PPSU) and sulfonated PPSU for membrane formation. *Polymer* 99 (2016) 72–82.
35. Lin Luo, Gang Han, Tai-Shung Chung, Martin Weber, Claudia Staudt, Christian Maletzko. Oil/water separation via ultrafiltration by novel triangle-shape tri-bore hollow fiber membranes from sulfonated polyphenylenesulfone. *J. Membr. Sci.* 476 (2015) 162–170.
36. Zhiwei Thong, Gang Han, Yue Cui, Jie Gao, Tai-Shung Chung, Sui Yung Chan, Shawn Wei. Novel nanofiltration membranes consisting of a sulfonated pentablock copolymer rejection layer for heavy metal removal. *Environ. Sci. Technol.* 48 (2014) 13880–13887.
37. Jia Hong Pan, Gang Han, Rui Zhou, X. S. Zhao. Hierarchical N-doped TiO<sub>2</sub> hollow microspheres consisting of nanothorns with exposed anatase {101} facets. *Chem. Commun.* 47 (2011) 6942–6944.
38. Esther Swin Hui Lee, Jun Ying Xiong, Gang Han, Chun Feng Wan, Qing Yu Chong, Tai-Shung Chung. A pilot study on pressure retarded osmosis operation and effective cleaning strategies. *Desalination* 420 (2017) 273–282.
39. Lin Luo, Peng Wang, Sui Zhang, Gang Han, Tai-Shung Chung. Novel thin-film composite tri-bore hollow fiber membrane fabrication for forward osmosis. *J. Membr. Sci.* 461 (2014) 28–38.
40. Soleyman Sahebi, Sherub Phuntsho, Leonard Tijing, Gang Han, Dong Suk Han, Ahmed Abdel-Wahab, Ho Kyong Shon. Thin-film composite membrane on a compacted woven backing fabric for pressure assisted osmosis. *Desalination* 406 (2017) 98–108.
41. Tai-Shung Chung, Xue Li, Rui Chin Ong, Qingchun Ge, Honglei Wang, Gang Han. Emerging forward osmosis (FO) technologies and challenges ahead for clean water and clean energy applications. *Curr. Opin. Chem. Eng.* 1 (2012) 246–257.
42. Pei Zhang, Shufen Zhang, Gang Han. Synthesis of novel asymmetric Zinc (II) phthalocyanines bearing octadecyloxy and glucosyl groups. *Molecules* 14 (2009) 3688–3693.

#### 著作章节 (Books & Chapters)

1. Gang Han, Yingnan Feng. Hollow Fiber Membranes: Fabrication and Applications (ISBN: 978-0-12-821876-1). Chapter 22: Recent development of pressure retarded osmosis (PRO) hollow fiber membranes. Edited by Tai-Shung Chung and Yingnan Feng, Elsevier, pages 473-493, 2021.
2. Wenxiao Gai, Gang Han. Membrane Technology for Osmotic Power Generation by Pressure Retarded Osmosis (ISBN: 978-0-367-25592-3). Chapter 2: Recent development of flat-sheet PRO membranes. Edited by Chun Feng Wan and Tai-Shung Chung, CRC press Taylor & Francis Group, pages 21-42, 2020.
3. Wenxiao Gai, Gang Han, Tai-Shung Chung. Membrane Technology for Osmotic Power Generation by Pressure Retarded Osmosis (ISBN: 978-0-367-25592-3). Chapter 3: Recent development of hollow fiber PRO membranes. Edited by Chun Feng Wan and Tai-Shung Chung, CRC press Taylor & Francis Group, pages 43-62, 2020.
4. Zhen Lei Cheng, Gang Han. Membrane Technology for Osmotic Power Generation by Pressure Retarded Osmosis (ISBN: 978-0-367-25592-3). Chapter 12: Design of other pressure retarded osmosis hybrid processes (Pressure retarded osmosis–membrane distillation and pressure retarded osmosis–forward osmosis). Edited by Chun Feng Wan and Tai-Shung Chung, CRC press Taylor & Francis Group, pages 285-318, 2020.
5. Zhenlei Cheng, Gang Han. Membrane Distillation: Membranes, Hybrid Systems, and Pilot Studies (ISBN: 978-0-367-25447-6). Chapter 12: Pressure retarded osmosis-membrane distillation. Edited by Kang-Jia Lu and Tai-Shung Chung, CRC press Taylor & Francis Group, pages 285-300, 2020.
6. 韩刚, 钟台生, 崔月, 罗琳. 薄膜科技概论 (ISBN: 9789577633446)。第八章正渗透。五南出版社, 台湾, 2019年7月10日。
7. Gang Han, Chunfeng Wan, Tai-Shung Chung. Membrane-Based Salinity Gradient Processes for Water Treatment and Power Generation (ISBN: 978-0-444-63961-5). Chapter 6: Hollow-fiber membranes for salinity gradient processes. Edited by Sarper Sarp and Nidal Hilal, Elsevier, pages 175-200, 2018.
8. Sui Zhang, Gang Han, Xue Li, Chunfeng Wan, Tai-Shung Chung. Sustainable Energy from Salinity Gradients (ISBN: 978-0-08-100323-7). Chapter 2: Pressure retarded osmosis: Fundamentals. Edited by Andrea Cipollina, Giorgio Micale, Woodhead Publishing, Elsevier, Pages 19-54, 2016.
9. Xue Li, Gang Han, Tai-Shung Chung. Forward Osmosis: Fundamentals and Applications (ISBN 978-0-7844-7923-0). Chapter 20: Membrane development for pressure retarded osmosis. Edited by Ho Kyong Shon, Sherub Phuntsho, Tian C. Zhang, Rao Y. Surampalli. American Society of Civil Engineers (ASCE), pages 465-487, 2015.

#### 专利 (Patents)

1. Martin Weber, Christian Maletzko, Martin Heijnen, Tai-Shung Chung, Gang Han. Integral asymmetric membrane of polyamide-imide and sulfonated polyarylether sulfone. WO 2019/076668 A1, 25 April 2019.
2. Gang Han and Tai-Shung Chung. Thin film composite membranes. WO 2014/042593, 20 March 2014.
3. Katsunori Nishiura, Masahiro Toriida, Masaji Tamai, Tai-Shung Chung, Gang Han. Resin composition for microporous supporting membrane and microporous supporting membrane using the same and semipermeable membrane. P001200874JP01, 9 Jan 2014.

#### 荣誉与奖励

- |      |  |
|------|--|
| 2021 | 入选南开大学“百名青年学科带头人培养计划”  |
| 2015 | Young Chemical Engineer of the Year Award (ICHEME, Singapore)                  |
| 2014 | NAMS Student Fellowship Awards (North American Membrane Society, NAMS)         |
| 2014 | The Sustainable Technology Award–Highly Commended (ICHEME, Singapore)          |
| 2014 | Young Chemical Engineer of the Year Award–Highly Commended (ICHEME, Singapore) |
| 2012 | Top Cited Paper Award for Chemical Engineering Science                         |
| 2012 | Top Cited Paper Award for Current Opinion in Chemical Engineering              |
| 2009 | NUS Research Scholarship (National University of Singapore, NUS)               |
| 2008 | 大连理工大学本科生优秀毕业论文  |
| 2008 | 大连理工大学化工学院优秀毕业生  |
| 2007 | 中石油奖学金   |

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