

Chanhee Boo

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Education

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| Sep.2012 – Present | Yale University
Department of Chemical and Environmental Engineering
- Advisor: Prof. Menachem Elimelech | <i>New Haven, CT, USA</i> |
| Mar.2009 – Feb.2011 | Korea University
M.S. in Civil, Environmental & Architectural Engineering
- Thesis: Investigation of fouling behavior in forward osmosis (FO) for seawater desalination and wastewater reclamation
- Advisor: Prof. Seungkwan Hong | <i>Seoul, KOREA</i> |
| Mar.2002 – Feb.2009 | Korea University
B.S. in Civil, Environmental & Architectural Engineering
Including mandatory military service (Nov. 2003 ~ Nov. 2005) | <i>Seoul, KOREA</i> |

Research Experience

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|---------------------|---|---------------------------|
| Sep.2012 – Present | Yale University
Prof. Elimelech's Lab | <i>New Haven, CT, USA</i> |
| | <ul style="list-style-type: none">▪ Development of Novel Close-loop Osmotic Heat Engine for Power Generation (ARPA-E, U.S. Department of Energy, DE-AR0000306)▪ Engineering Research Center for Nanotechnology-Enabled Water Treatment (ERC-1449500) | |
| Mar.2009 – Jun.2012 | Korea University
Water Environmental Plant Engineering Lab. | <i>Seoul, KOREA</i> |
| | <ul style="list-style-type: none">▪ Emerging Applications of Nanotechnology in Membrane-Based Desalination and Water Reuse Systems<ul style="list-style-type: none">• Sponsor: World Class University (WCU) program (Case III), National Research Foundation of Korea funded by the Ministry of Education, Science and Technology (R33-10046).• Research topics<ul style="list-style-type: none">- Studies on forward osmosis (FO) fouling and rejection mechanisms- Developing strategies for fabricating antifouling membranes- Application of nanomaterials incorporated membranes | |
| Jul.2011 – Jun.2012 | <ul style="list-style-type: none">▪ Development of Seawater Desalination Membrane with Low Energy Consumption and High Water Flux<ul style="list-style-type: none">• Sponsor: Fundamental R&D Program for Technology of World Premier Materials funded by the Ministry of Knowledge Economy• Research topics<ul style="list-style-type: none">- Developing new parameters for the evaluation of FO membrane performances- Fouling assessment in water integrated plant system | |
| Oct.2009 – Sep.2010 | <ul style="list-style-type: none">▪ Development of multi-purpose desalination plant based on forward osmosis<ul style="list-style-type: none">• Sponsor: Ministry of Knowledge Economy• Research topics<ul style="list-style-type: none">- Development of forward osmosis membrane and module- FO membrane characterization | |
| Mar.2009 – Feb.2011 | <ul style="list-style-type: none">▪ Seawater Engineering & Architecture of High Efficiency Reverse Osmosis (SEAHERO) program<ul style="list-style-type: none">• Sponsor: Ministry of Land, Transport and Maritime Affairs (MLTM)• Research topics<ul style="list-style-type: none">- Next generation RO membrane analysis and process-diagnosis technology- Evaluation of RO membrane fouling potential by new fouling index | |

Publications

- [1] **Chanhee Boo**, Jongho Lee, and Menachem Elimelech, "Engineering Surface Energy and Nanostructure of Microporous Films for Expanded Membrane Distillation Application", *Environ. Sci. Technol.*, 50 (2016) 8112-8119.
- [2] **Chanhee Boo**, Yehia F. Khalil, and Menachem Elimelech, "Performance Evaluation of Trimethylamine–Carbon Dioxide Thermolytic Draw Solution for Engineered Osmosis", *Journal of Membrane Science*, 473 (2015) 302-309
- [3] **Chanhee Boo**, Menachem Elimelech, and Seungkwan Hong, "Fouling control in forward osmosis process integrating seawater desalination and wastewater reclamation", *Journal of Membrane Science*, 444 (2013) 148-156
- [4] **Chanhee Boo**, Sangyoun Lee, Menachem Elimelech, Zhiyong Meng, and Seungkwan Hong, "Colloidal fouling in forward osmosis: Role of reverse salt diffusion", *Journal of Membrane Science*, 390-391 (2012) 277-284
- [5] Evyatar Shaulsky,[†] **Chanhee Boo**,[†] Shihong Lin, and Menachem Elimelech, "Membrane-Based Osmotic Heat Engine with Organic Solvent for Enhanced Efficiency", *Environ. Sci. Technol.*, 49 (2015) 5820-5827 ([†]**First-Co Author**)
- [6] Siamak Nejati[†], **Chanhee Boo**[†], Chinedum Osuji, Menachem Elimelech, "Engineering flat sheet microporous PVDF films for membrane distillation", *Journal of membrane science*, 492 (2015) 355-363 ([†]**First-Co Author**)
- [7] Jongho Lee, **Chanhee Boo**, Won-Hee Ryu, André D. Taylor and Menachem Elimelech "Development of Omniphobic Desalination Membrane Using a Charged Electrospun Nanofiber Scaffold", *ACS Applied Materials & Interfaces*, 8 (2016) 11154-11161
- [8] Xinglin Lu, **Chanhee Boo**, Jun Ma, and Menachem Elimelech, "Bidirectional Diffusion of Ammonium and Sodium Cations in Forward Osmosis: Role of Membrane Active Layer Surface Chemistry and Charge", *Environ. Sci. Technol.*, 48 (2014) 14369-14376
- [9] Sangyoun Lee, **Chanhee Boo**, Menachem Elimelech, and Seungkwan Hong, "Comparison of fouling behavior in forward osmosis (FO) and reverse osmosis (RO)", *Journal of Membrane Science* 365 (2011) 34-39
- [10] Shihong Lin, Siamak Nejati, **Chanhee Boo**, Yunxia Hu, Chinedum Osuji, Menachem Elimelech, "Omniphobic Membrane for Robust Membrane Distillation", *Environ. Sci. Technol. Lett.*, 1 (11) (2014) 443-447
- [11] Minkyu Park, Jijung Lee, **Chanhee Boo**, Seungkwan Hong, Shane A. Snyder, Joonha Kim, "Modeling of colloidal fouling in forward osmosis membrane: Effects of reverse draw solution permeation", *Desalination*, 314 (2013) 115-123

Conference Publications

- [1] Chanhee Boo, Sangyoun Lee, Menachem Elimelech, Seungkwan Hong, "Fouling Control in Osmotic Dilutions Process for Seawater Desalination and Wastewater Reclamation", IWA Regional Conference on Wastewater Purification & Reuse 2012, March 29-30, 2012, Crete, Greece
- [2] Chanhee Boo, Dae Kim, Younjin Kim, Sangyoun Lee, Menachem Elimelech, Seungkwan Hong, "Colloidal fouling in forward osmosis (FO): Abnormal behavior of silica colloidal particles", (Poster) World's leading trade exhibition for process, drinking and waste water, Nov 1-4, 2011, Amsterdam, Netherlands
- [3] Chanhee Boo, Sangyoun Lee, Changwoo Kim, Yoontaek Oh, Seungkwan Hong, Menachem Elimelech, "Colloidal Fouling in Forward Osmosis: Role of Reverse Diffusion in Colloidal Fouling", The 3rd International Desalination Workshop, Nov 3-6, 2010, Jeju, Korea
- [4] Chanhee Boo, Sangyoun Lee, Changwoo Kim, Suingil Choi, Menachem Elimelech, Seungkwan Hong, "Investigation of fouling layer characteristics in forward and reverse osmosis systems", MDIW(Membrane in Drinking and Industrial Water Treatment), June 27-30, 2010, Trondheim, Norway
- [5] Chanhee Boo, Sangyoun Lee, Menachem Elimelech, Seungkwan Hong, "Reversibility of Membrane Fouling in Forward Osmosis (FO) for Wastewater Reclamation", (Poster) IWA DEWATS Conference, Mar 23-26, 2010, Surabaya, Indonesia
- [6] Chanhee Boo, Sangyoun Lee, and Seungkwan Hong, Menachem Elimelech, "Direct Comparison of Fouling Behaviors in Forward and Reverse Osmosis", IWA Membrane Technology Conference & Exhibition 2009, Sep 1-3, 2009, Beijing, P.R.China

Scholarship Achievements

(Undergraduate)

2nd Semester, 2006 Honors Scholarships, Korea University
1st Semester, 2007 The Welfare Section Scholarship, Korea University
2nd Semester, 2007 Department of Civil & Environmental Engineering, Korea University
1st Semester, 2008 Honors Scholarship, Korea University

(Graduate)

1st Semester, 2009 The Second Stage of BK21 Scholarship
2nd Semester, 2009 The Second Stage of BK21 Scholarship
1st Semester, 2010 Research Assistant Scholarship
1st Semester, 2010 The Second Stage of BK21 Scholarship
2nd Semester, 2010 The Second Stage of BK21 Scholarship

Experimental Skills

Scanning electron microscope (SEM, Hitach SU-70)

Atomic force microscope (AFM)

Streaming potential measurement (EKA)

Attenuated total reflectance Fourier transform infrared (ATR-FTIR)

Ion chromatography (IC)

Contact angle measurement

Electrospinning operation

Porometer operation

Forward Osmosis (FO), Reverse Osmosis (RO), Membrane Distillation (MD) unit constructions and operations

X-ray powder diffraction (XRD)