

EDUCATION

Ph.D. candidate (continued), Department of Chemical Engineering, The University of Texas at Austin, USA, Present.
Advisors: Dr. Manish Kumar and Dr. Benny D. Freeman

Ph.D. candidate, Department of Chemical Engineering, The Pennsylvania State University, USA, Aug 2016 – Jul 2019.
(GPA: 3.71/4.0)

Advisor: Dr. Manish Kumar

M.S., School of Chemical Engineering, Sungkyunkwan University, South Korea, Aug 2015.
(GPA: 4.0/4.5)

Advisor: Dr. Soong Ho Um

B.S., School of Chemical Engineering, Sungkyunkwan University, South Korea, Feb 2014.
(GPA: 3.86/4.5)

Advisor: Dr. Soong Ho Um

PROFESSIONAL POSITIONS

Research Internship, Center for Theragnosis, Korea Institute of Science and Technology, Oct 2015 – Aug 2016
Advisor: Dr. Dae-Ro Ahn

Sergeant, Military Service in Republic of Korea Marine Corps, Apr 2009 – Feb 2011.

PUBLICATIONS

FIRST AUTHOR (including shared first author)

1. W. Song, H. Joshi, R. Chowdhury, J. S. Najem, Y.-x. Shen, C. Lang, C.B. Henderson, Y.-M. Tu, M. Farrell, M.E. Pitz, C.D. Maranas, P.S. Cremer, R. J. Hickey, S.A. Sarles, J.-l. Hou, A. Aksimentiev, and M. Kumar, Artificial Water Channels Enable Fast and Selective Water Permeation Through Water-Wire Networks. **Nature Nanotechnology** DOI: 10.1038/s41565-019-0586-8.
2. Y.-M. Tu[†], W. Song[†], T. Ren[†], Y.-x. Shen, R. Chowdhury, P. Rajapaksha, T.E. Culp, L. Samineni, C. Lang, A. Thokkadam, D. Carson, Y. Dai, A. Mukthar, M. Zhang, A. Parshin, J.N. Sloand, S.H. Medina, M. Grzelakowski, D. Bhattacharya, W.A. Phillip, E.D. Gomez, R.J. Hickey, Y. Wei, and M. Kumar, Rapid Fabrication of Precise, High-Throughput Filters from Membrane Protein Nanosheets. **Nature Materials** accepted. ([†]Equal contribution)
3. W. Song, and M. Kumar, Artificial water channels: toward and beyond desalination. **Current Opinion in Chemical Engineering** 2019 25, 9-17.
4. W. Song, Y.-M. Tu, H. Oh, L. Samineni, and M. Kumar, Hierarchical Optimization of High Performance Biomimetic and Bioinspired Membranes. **Langmuir** 2019 35(3), 589-607. (Featured as ACS Editor's Choice)
5. Y.-x. Shen[†], W. Song[†], D.R. Barden, T. Ren, C. Lang, H. Feroz, C.B. Henderson, P.O. Saboe, D. Tsai, H. Yan, P.J. Butler, G.C. Bazan, W.A. Phillip, R.J. Hickey, P.S. Cremer, H. Vashisth, and M. Kumar, Achieving High Permeability and Enhanced Selectivity for Angstrom-scale Separations Using Artificial Water Channel Membranes. **Nature Communications** 2018 9, 2294. ([†]Equal contribution)
6. W. Song, C. Lang, Y.-x. Shen, and M. Kumar, Design Considerations for Artificial Water Channel-based Membranes. **Annual Review of Materials Research** 2018 48, 57-82.
7. W. Song, Y.-x. Shen, C. Lang, P. Saha, I.V. Zenyuk, R.J. Hickey, and M. Kumar, Unique Selectivity Trends of Highly Permeable PAP[5] Water Channel Membranes. **Faraday Discussions** 2018 209, 193-204.
8. W.C. Song, K.-R. Kim, M. Park, K.E. Lee, and D.-R. Ahn, Backbone-modified Oligonucleotides for Tuning the Cellular Uptake Behavior of Spherical Nucleic Acids. **Biomaterials Science** 2017 5(3), 412-416.
9. W.C. Song, S.W. Shin, K.S. Park, M.S. Jang, J.-H. Choi, B.-K. Oh, and S.H. Um, Self-illuminative Reaction-cascade-driven Anticancer Therapeutic Cassettes Made of Cooperatively Interactive Nanocomplexes. **Colloids and Surfaces, B: Biointerfaces** 2015 126, 580-584.
10. S.W. Shin[†], W.C. Song[†], A.R. Kim, S.-W. Cho, D.-I. Kim, and S.H. Um, Novel Stem-loop RNA and Drug-bearing DNA Hybrid Nanostructures Specific to LNCaP Prostate Carcinoma. **Biomaterials Science** 2014 2, 76-83. ([†]Equal contribution)
11. W.C. Song, H.-J. Sung, K.S. Park, J.-W. Choi, J.-Y. Cho, and S.H. Um, Novel Functional Renilla Luciferase Mutant Provides Long-term Serum Stability and High Luminescence Activity. **Protein Expression and Purification** 2013 91(2), 215-220.

CO-AUTHORED

12. C. Lang, J.A. LaNasa, N. Utomo, Y. Xu, M.J. Nelson, W. Song, M.A. Hickner, R.H. Colby, M. Kumar, and R.J. Hickey, Solvent-

Non-Solvent Rapid-Injection: A Facile Route to Versatile and Recyclable Nanostructured Hydrogels. **Nature Communications** 2019 10, 3855.

13. C. Lang, D. Ye, W. Song, C. Yao, Y.-M. Tu, C. Capparelli, J. LaNasa, M. A. Hickner, E. Gomez, E. Gomez, R. J. Hickey, M. Kumar, Biomimetic Separation of Transport and Matrix Functions in Lamellar Block Copolymer Channel-Based Membranes. **ACS Nano** 2019 13(7), 8292-8302.
14. M. Baaden, M. Barboiu, R.M. Bill, C.-L. Chen, J. Davis, M.D. Vincenzo, V. Freger, M. Fröba, P.A. Gale, B. Gong, C. Hélix-Nielsen, R. Hickey, B. Hinds, J.-L. Hou, G. Hummer, M. Kumar, Y.-M. Legrand, M. Lokesh, B. Mi, S. Murail, P. Pohl, M. Sansom, Q. Song, W. Song, S. Törnroth-Horsefield, H. Vashisth, and M. Vögele, Biomimetic water channels: general discussion. **Faraday Discussions** 2018 209, 205-229.
15. M. Baaden, M. Barboiu, M.P. Borthakur, C.-L. Chen, R. Coason, J. Davis, V. Freger, B. Gong, C. Hélix-Nielsen, R. Hickey, B. Hinds, W. Hirunpinyopas, A. Horner, J.-L. Hou, G. Hummer, P. Iamprasertkun, K. Kazushi, M. Kumar, Y.-M. Legrand, M. Lokesh, B. Mi, S. Mitra, S. Murail, A. Noy, S. Nunes, P. Pohl, Q. Song, W. Song, S. Törnroth-Horsefield, and H. Vashisth, Applications to Water Transport Systems: general discussion. **Faraday Discussions** 2018 209, 389-414.
16. C. Lang, Y.-x. Shen, J.A. LaNasa, D. Ye, W. Song, T.J. Zimudzi, M.A. Hickner, E.D. Gomez, E.W. Gomez, M. Kumar, and R.J. Hickey. Creating Cross-linked Lamellar Block Copolymer Supporting Layers for Biomimetic Membranes. **Faraday Discussions** 2018 209, 179-191.
17. M.S. Jang, W. Song, S.W. Shin, K.S. Park, B.-W. Kim, J. Kim, and S.H. Um, A Novel Multigene Cloning Method for the Production of a Motile ATPase. **Journal of Biotechnology** 2015 207, 1-7.
18. S.W. Shin, K.S. Park, M.S. Jang, W.C. Song, J. Kim, S.-W. Cho, J.Y. Lee, J.H. Cho, and S.H. Um, X-DNA Origami-networked Core-supported Lipid Stratum. **Langmuir** 2015 31(3), 912-916.
19. B.J. Kim, S.H. Um, W.C. Song, Y.H. Kim, M.S. Kang, and J.H. Cho, Water-gel for Gating Graphene Transistors. **Nano Letters** 2014 14(5), 2610-2616.
20. S.J. Bae, W.C. Song, S.H. Jung, S.-W. Cho, D.-I. Kim, and S.H. Um, A Gene-networked Gel Matrix-supported Lipid Bilayer as a Synthetic Nucleus System. **Langmuir** 2012 28(49), 17036-17042.

CONFERENCE

ORAL PRESENTATIONS (selected)

1. Forming Water-Wire Networks and Achieving Aquaporin-like Water Permeability and Water/Salt Selectivity Using Artificial Water Channels. American Institute of Chemical Engineers (AIChE) annual meeting, Orlando, FL, USA.
2. Cluster Formation of Artificial Water Channels Enable High Water/salt Permselectivity. 2019 American Chemical Society (ACS) Fall National Meeting, San Diego, CA, USA.
3. Design, Synthesis, and Characterization of Artificial Water Channel Based Polymeric Membranes. 2018 American Institute of Chemical Engineers (AIChE) annual meeting, Pittsburg, PA, USA.
4. Unique Selectivity Trends of Highly Permeable PAP[5] Water Channel Membranes. Faraday Discussions: Artificial Water Channels 2018, Glasgow, UK.
5. Bioinspired Artificial Channel Based Polymeric Membranes. The North American Membrane Society (NAMS) 2018, Lexington, KY, USA.
6. Peptide-appended Hybrid[4]arenes are Artificial Water Channels with High Permeability and Selectivity. 2017 American Institute of Chemical Engineers (AIChE) annual meeting, Minneapolis, MN, USA.

POSTER PRESENTATIONS (selected)

1. Rapid and Selective Water Permeation Across Biomimetic Membranes Through Artificial Water Channel Aggregates. The North American Membrane Society (NAMS) 2019, Pittsburg, PA, USA.
2. Fast and Selective Water Slides for Biomimetic Membranes. 2018 Gordon Research Conference (GRC) Membranes: Materials and Processes. New London, NH, USA.
3. Self-illuminative Cascade-reaction-driven Anticancer Therapeutic Cassettes. European Materials Research Society (MRS) 2015 spring meeting, Lille, France.
4. Novel Self-illuminative Cooperative Theragnostic Cassettes. Materials Research Society (MRS) 2014 spring meeting, San Francisco, CA, USA.

AWARDS

1. Best of Show (grand prize in all competition), Materials Visualization Competition 11, Materials Research Institute and Department of Materials Science and Engineering, The Pennsylvania State University, 2019.
2. Graduate Student Excellence Award: Best Ph.D. candidacy exam, Department of Chemical Engineering, The Pennsylvania State University, 2017.
3. SKKU Family Award (Grand prize): SKKU President's Award for Academic and Research Excellence, Sungkyunkwan University (SKKU), 2014.