Youngsoo Joung, Ph.D.

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숙명여자대학교 SOOKMYUNG WOMEN'S UNIVERSITY

▪ EDUCATION

June 2014	**Massachusetts Institute of Technology, Cambridge, USA** **Ph.D.** in Mechanical Engineering, Advisor: Prof. Cullen R. Buie Thesis: "Electric Field Based Fabrication Methods for Multi-scale Structured Surfaces"
Feb. 2006	**Seoul National University, Seoul, South Korea** **M.S.** in Mechanical & Aerospace Engineering, Advisor: Prof. Yoon Young Kim Thesis: "Local-Mode-Free Topology Optimization Formulation for Vibrating Structures with Element Connectivity Parameterization Method"
Feb. 2004	**Yonsei University, Seoul, South Korea** **B.S.** in Mechanical Engineering, Advisor: Prof. Yong Hoon Jang Thesis: "Thermoelastic Instability in Functionally Graded Materials" *Outstanding Scholastic Achievement Award*

▪ RESEARCH & WORK EXPERIENCE

	Sookmyung Women's University, Seoul, Republic of Korea Department of Mechanical Systems Engineering
Feb. 2022–present	**Associate Professor**
Mar. 2017–Feb. 2022	**Assistant Professor**
Feb. 2019–Jan. 2021	**Department Chairperson and Head**
Nov. 2022–present	**ACE Inventor Inc., Republic of Korea** **CEO & Founder**
July 2015–Feb. 2017	**Massachusetts Institute of Technology, Cambridge, USA** Department of Civil & Environmental Engineering Fluid Dynamics of Disease Transmission Group, Principal Investigator: Prof. Lydia Bourouiba **Postdoctoral Fellow** **Research topics** *Disease Transmission by Droplets*
Sept. 2009–July 2015	**Massachusetts Institute of Technology, Cambridge, USA** Department of Mechanical Engineering Laboratory of Energy and Microsystems Innovation, Advisor: Prof. Cullen R. Buie **Research Assistant** (Sept. 2009–June 2015) **Postdoctoral Associate and Instructor of Thermal-Fluids Engineering** (June 2014-July 2015) **Research topics** *Fabrication Methods for Multi-scale Structured Surfaces* *Liquid Transport and Droplet Dynamics on Porous Media* *Pathogen Transfer by Aerosol*
Feb. 2006–July 2009	**Samsung Advanced Institute of Technology (SAIT), Yong-In, Republic of Korea** Energy Group, Director: Dr. Hyuk Chang **Research Staff** **Projects**

Direct Methanol Fuel Cells for Portable Devices

Feb. 2004–Feb.2006 **Multi Scale Design Center, Seoul National University, Seoul, Republic of Korea**
Research Assistant, Advisor: Prof. Yoon Young Kim
Research topics
Computer Simulation Based Design Optimization

▪ PUBLICATIONS

Peer-Reviewed Papers

1. Yu Jeong Kim and **Young Soo Joung**," Enhancing Ion Transfer Efficiency of Copper Nanoparticles with Hydrogel Composite Layers for Antibacterial and Antifungal Surfaces," submitted.
2. Sunbeen Choi, Seungyeon Lee, Jeeyoon Kim, Dogyeong Kim, Hyunji Myung, **Young Soo Joung**, "Biocompatible Geobacter-Hydrogel-MCNT Composite Electrodes for Highly Efficient and Durable Microbial Fuel Cells," submitted.
3. Subin Han, Hyunji Myung, **Young Soo Joung**, "The Effect of Particulate Matter on Bacterial Lifespan in Droplet Nucleus" submitted.
4. Hyunji Myung, **Young Soo Joung**,"Contribution of Particulates to Airborn Disease Transmission: A review," Environ. Sci. Technol. 2024, 58, 16, 6846–6867. (11.4 Impact Factor) [Link].
5. Dogyeong Kim, **Young Soo Joung**, "Sodium alginate based artificial biofilms polymerized by electrophoretic deposition for microbial hydrogen generation," International Journal of Biological Macromolecules, Volume 248, 2023, 125887, ISSN 0141-8130. (8.2 Impact Factor) [Link]
6. Youngri Ryu, Soonjong Roh, **Young Soo Joung**, "Assessing the cytotoxicity of aerosolized carbon black and benzo[a]pyrene with controlled physical and chemical properties on uman lung epithelial cells," Sci Rep 13, 9358 (2023). (4.997 Impact Factor) [Link]
7. Soonjong Roh, Youngri Ryu, **Young Soo Joung**, "The Effect of PhIP Precursors on the Generation of Particulate Matter in Cooking Oil Fumes at High Cooking Temperatures and the Inflammation Response in Human Lung Cells," Journal of Hazardous Materials, Volume 441, 5 January 2023, 129792. (14.224 Impact Factor). [Link]
8. Subin Han, Seunghyeon Lee, **Young Soo Joung,** "Long-term effect of nanobubbles generated by turbulent flow through diamond-pattern notches on liquid properties," Results in Engineering, Volume 14, June 2022, 100375. (5.0 Impact Factor) [Link]
9. Jeeyoon Kim, Hyunjung Lee, **Young Soo Joung**, "Antibacterial Fabric with Contradictory Functions of Water Repellency and Absorbency Realized by Electrophoretic Deposition of Hydrophobic SiO_2 and Hydrophilic ZnO Nanoparticles," Progress in Organic Coatings, Volume 161, December 2021, 106455. (6.206 Impact Factor) [Link]
10. Jeeyoon Kim, Seunghyeon Lee, **Young Soo Joung**, "Schlieren Imaging for the Visualisation of Particles Entrapped in Bubble Films," Journal of Colloid & Interface Science, Volume 570, 15 June 2020, Pages 52-60. (9.965 Impact Factor) [Link]
11. **Young Soo Joung**, "A Mean-Density Model of Ionic Surfactants for the Dispersion of Carbon Nanotubes in Aqueous Solutions," Applied Surface Science, Volume 439, 2018, Pages 1133-1142. (7.392 Impact Factor) [Link]
12. **Young Soo Joung**, Eric Bailey, Robert B. Ramirez, and Cullen R. Buie, "Conductive Hydrogel Films Produced by Freestanding Electrophoretic Deposition and Polymerization at the Interface of Immiscible Liquids," Composites Science and Technology, Volume 153, 2017, Pages 128-135. (9.879 Impact Factor) [Link]
13. **Young Soo Joung**, Zhifei Ge and Cullen R. Buie, "Bioaerosol Generation by Raindrops on Soil," *Nature Communications* 8, 14668 (2017). (17.694 Impact Factor) [Link]
    Media release in US
    MIT News: "A light rain can spread soil bacteria far and wide, study finds" (Featured article) [Link]
    Nature Asia: "Environment: Rainfall can mobilise microbes" [Link]
    New Scientist: "Raindrops make soil bacteria take off and fly through air" [Link]
    Media release in Korea
    KBS News 9: "Soil Bacteria Transferred by Raindrop Impact" [Link]
14. **Young Soo Joung**, Cullen R. Buie, "Antiwetting Fabric Produced by a Combination of Layer-by-Layer Assembly and Electrophoretic Deposition of Hydrophobic Nanoparticles," *ACS Applied Materials & Interfaces*, 2015, 7 (36), pp 20100–20110. (10.383 Impact Factor) [Link]
15. Jessamine A. Quijano, **Young Soo Joung**, Nichola Kinsinger, Xinglin Lu, Cullen R. Buie, Sharon L. Walker, "Antimicrobial Behavior of Novel Surfaces Generated by Electrophoretic Deposition and Breakdown Anodization," *Colloids and Surfaces B: Biointerfaces*, Vol.134, pp. 204–212, 2015. (5.999 Impact Factor) [Link]
16. **Young Soo Joung**, Cullen R. Buie, "Aerosol Generation by Raindrop Impact on Soil," *Nature Communications* **6**, 6083, 2015. (17.694 Impact Factor) [Link]
    Media release in USA
    The New York Times: "How the Smell of Rain Bubbles From the Ground" [Link]
    The Washington Post: "Slow-mo Video of Raindrops Reveals How Rain Gets Its Distinctive Smell" [Link]
    BBC: "How the Smell of Rain Happens" [Link]
    The Huffington Post: "Crazy Slo-Mo Video Explains Why Rain Has That Distinctive Smell" [Link]

USA Today: "Study Answers Why It Smells So Good After It Rains" [Link]
ABC News: "Slow-Mo Video Uncovers Why It Smells Good After It Rains" [Link]

Media release in Korea

Chosun Ilbo: "Aerosol from Raindrops: The Secret of Fresh Fragrance of Spring" [Link]
Hankyoreh Science-On: "Petrichor Transferred by Aerosol Droplets Generated by Raindrops on Soils" [Link]
YTN Science: "Aerosol Generated by Raindrops: the Secret of Spring Fragrance" [Link]
MBC News Desk: "The Secret of Strong Earth Fragrance from Spring Rain" [Link]

17. **Young Soo Joung**, Bruno Michel Figliuzzi, Cullen R. Buie, "Design of Capillary Flows with Functionally Graded Porous Titanium Oxide Films Controlled by Anodization Instability," *Journal of Colloid and Interface Science*, Vol. 423, pp. 143–150, 2014. (8.128 Impact Factor) [Link]
    Note: **Spotlighted on the Interpore Newsletters of the International Society for Porous Media** [Link]
18. **Young Soo Joung**, Cullen R. Buie, "Scaling Laws for Drop Impingement on Porous Films and Papers," *Physical Review E*, 89, 013015 (2014). (2.529 Impact Factor) [Link]
    Note: **Best Poster Award** from the *5th International Conference on Porous Media & Annual Meeting*, 05/2013 [Link]
19. Kuang-Han Chu, **Young Soo Joung**, Ryan Enright, Cullen R. Buie and Evelyn N. Wang, "Hierarchical Surfaces for Critical Heat Flux Enhancement," *Applied Physics Letters,* 102, 151602 (2013). (3.791 Impact Factor) [Link]
20. **Young Soo Joung,** Cullen R. Buie, "A Hybrid Method Employing Breakdown Anodization and Electrophoretic Deposition for Superhydrophilic Surfaces," *Journal of Physical Chemistry B*, 2013, 117 (6), pp. 1714-1723. (3.72 Impact Factor) [Link]
21. **Young Soo Joung,** Cullen R. Buie, "Hybrid Electrophoretic Deposition with Anodization Process for Superhydrophilic Surfaces to Enhance Critical Heat Flux," *Key Engineering Materials*, Vol. 507 (2012) pp. 9-13. [Link]
22. **Young Soo Joung,** Cullen R. Buie, "Electrophoretic Deposition of Unstable Colloidal Suspensions for Superhydrophobic Surfaces," *Langmuir,* 2011. 27(7): pp. 4156-4163. (4.46 Impact Factor) [Link]
23. Gil Ho Yoon, **Young Soo Joung**, Yoon Young Kim, "Optimal Layout Design of Three-Dimensional Geometrical Nonlinear Structures Using the Element Connectivity Parameterization Method," *International Journal for Numerical Methods in Engineering*, Vol.69 (10), pp.1278–1304, 2007. (2.06 Impact Factor) ([Link]
24. **Young Soo Joung**, Gil Ho Yoon, Yoon Young Kim, "Topology Optimization using the Element Connectivity Parameterization Method in Three Dimensional Design Domain," *Trans. of KSME(A)*, Vol. 29, No. 7, pp. 990–997, 2005. [Link]

Conference Proceedings

25. Hyunji Myung, Soonjong Roh, Gahee Kim, Youngri Ryu, **Young Soo Joung**, "Toxicity Assessment of Cooking on Human Lung Cells Based on Cooking Temperature and Food Ingredients," 2024 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 07/2024.
26. Hyun Jung Lee, Neung Hwan Yim, **Young Soo Joung** and Yoon Young Kim, "Dimension Reduction of Mechanism Ground Structures based on Spring-Connected Rigid Block Model Using Variational Autoencoder," *2023 KSME Annual Meeting*, 11/2023.
27. Subin Han, Hyunji Myung, **Young Soo Joung**, "Evaluation of Survival Rates of Pathogenic Bacteria in Various Porous Structures of Particulate Matter, Society of Toxicology," *62nd Annual Meeting and ToxExpo*, Nashville, Tennessee, USA, 03/2023.
28. Subin Han, Seunghyeon Lee, **Young Soo Joung**, "Investigation of Bacteria Bubbles using Schlieren Imaging to Reveal the Effect of Bacteria Wettability on Bacterial Enrichment in Bubble Films," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
29. Younglee Ryu, Sunjong Noh, Youjung Kim, **Young Soo Joung**, "Effect of Particulate Matter on Bacterial Survival in Human Respiratory Droplets," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
30. Sunjong Noh, Younglee Ryu, Dokyung Kim, **Young Soo Joung**, "Effects of Cooking Oil Fumes (COFs) Generated at Different Temperatures on the Inflammation of Human Lung Cells," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
31. Sunjong Noh, Hyunji Myung, Seungjun Kim, **Young Soo Joung**, "Inflammatory Response in Lungs Caused by Particulate Matter Produced from Carbon Black and Benzo[a]pyrene," 2020 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2020.
32. Hyunji Myung, Subin Han, and **Young Soo Joung,** "Impact of Particulate Matter on airborne bacterial viability," 2019 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2019.
33. Jiyun Kim, Hyunjung Lee, and **Young Soo Joung,** "Antifouling Fabric Resisting Bacterial Droplets," 2019 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2019.
34. **Young Soo Joung**, Yoon Young Kim, "The Topology Design Optimization of Cooling Fins Using the Internal Element Connectivity Parameterization Method," *Proceedings of the Fall Conference of KSME*, Nov. 2005. [Link]
35. **Young Soo Joung**, Gil Ho Yoon, Yoon Young Kim, "Lumped Mass Modeling for Local-Mode-Suppressed Element Connectivity Parameterized Topology Optimization of Vibrating Structures," *Proceedings of the 6th World Congress on Structural and Multidisciplinary Optimization*, 2005. [Link]

36. Gil Ho Yoon, **Young Soo Joung**, Yoon Young Kim, "Optimal Layout Design Using the Element Connectivity Parameterization Method: Application to Geometrical Nonlinear Structures," *Proceedings of the 6th World Congress on Structural and Multidisciplinary Optimization*, 2005. [Link]
37. **Young Soo Joung**, Gil Ho Yoon, Yoon Young Kim, "Local Vibration Mode Free Topology Optimization Formulation for Vibrating Structures with Self-Weight Consideration," *Proceedings of the Spring Conference of KSME*, May 2005. [Link]

▪ PATENTS

1. **Young Soo Joung,** Jeeyoon Kim, Hyun Young Lee, Gahee Yoo, "Dye-sensitized Solar Cell Comprising Hydrogel Electrolyte and Method for Manufacturing the Same," **10-2020-0023515**, 2020-02-26.
2. **Young Soo Joung,** Gahee Yoo, "Electrolyte of Dye-sensitized Solar Cell and Method for Manufacturing the Same," **10-2020-0023515**, (2020-02-26)
3. **Young Soo Joung,** Han Su Bin, Hyunjung Lee, Seunghyun Lee, Seungyeon Lee, "Wearable Air Purifier," **10-2020-0022126**, (2020-02-24).
4. **Young Soo Joung**, Jeeyoon Kim, Seungyeon Lee, and Hyunju Myung, "High-efficiency microbial fuel cell using conductive hydrogel," **10-2019-0043922**, (2019-04-15).
5. **Young Soo Joung**, Myung Hyunj, and Han Su Bin, "Dry powder storage using a porous structure of bacteria-nanoparticles," **10-2019-0057031**, (2019-05-15).
6. **Young Soo Joung**, Jeeyoon Kim, Hyunjung Lee, and Yeonha Cho "Preparation method and Device for functional materials," **10-2019-0030763**, (2019-03-18).
7. **Young Soo Joung**, Jeeyoon Kim, and Seunghyun Lee, "Development of real-time detection methods using bubbles for pathogenic microbes in water, 10-2019-0020701, (2019-02-21).
8. **Young Soo Joung**, Myung Hyunj, "Aerosol generation technique using porous surface," **10-2019-0054459**, (2019-05-09).
9. **Young Soo Joung**, Jeeyoon Kim, Seungyeon Lee, and Hyunji Myung, "Functional hydrogel molding method using electrophoresis," **10-2019-0033049**, (2019-03-22)**.**
10. **Young Soo Joung**, Cullen R. Buie, "Electrophoretic-Deposited Surfaces," **US Patent: US9096942**, (2015-08-04). [Link]
11. **Young Soo Joung**, Hye-jung Cho, Sang-Ho Yoon, "Fuel cell system having fuel circulation structure, method of operating the same, and electronic apparatus including the fuel cell system," **US Patent: US8993196**, (2015-03-31). [Link]
    Note: **Strategic Patent Designation** *from Fuel Cell Group of SAIT.*
12. Seong Kee Yoon, **Young Soo Joung**, Jung Kurn Park, Hye Jung Cho, In Seob Song, "Fuel Cell System," **US Patent: US8735008**, (2014-05-27). [Link]
13. **Young Soo Joung**, Hye Jung Cho, "Recycler for Direct Methanol Fuel Cell and Method of Operating the Same," **US Patent: US8722261**, 2014-05-13. [Link]
    Note: **Strategic Patent Designation** *from Fuel Cell Group of SAIT.*
14. Hye Jung Cho, **Young Soo Joung**, Hyuk Chang, "Power Unit and Cartridge, and Fuel Cell System Comprising Power Unit and Cartridge," **US Patent: US8722282**, (2014-05-13). [Link]
    Note: **Registered in Standards - IEC TC 105 WG#10**; International Electrochemical Commission (IEC), Technical Committee No.105 (TC105) – Fuel cell Technologies, Working Group #10, Portable Fuel Cell Appliance – Interchangeability.
15. Jae Yong Lee, Hye Jung Cho, Young-Jae Kim, Hu Lei, **Young Soo Joung**, "Fuel Battery System and Fuel Battery Operation Method," **US Patent: US8691455**, (2014-04-08). [Link]
16. Seong Kee Yoon, **Young Soo Joung**, Jung Kurn Park, Hye Jung Cho, In Seob Song, "Fuel Cell System," **US Patent: US8481221**, (2013-07-09). [Link]
17. **Young Soo Joung**, Young Sung Na, Hye Jung Cho, "Direct Methanol Fuel Cell System," **US Patent: US8470487**, (2013-06-25). [Link]
18. **Young Soo Joung**, Hye Jung Cho, Jung Kurn Park, In Seob Song, Seong Kee Yoon, "Fuel Cell System and Recovery Unit for Fuel Cell System," **China Patent: CN101807706**, (2013-04-17). [Link]
19. Young Seung Na, In Seob Song, **Young Soo Joung**, Mi Jeong Song, Hye Jung Cho, "Fuel Cell System: A New Fuel Management System," **China Patent: CN101853957**, (2013-02-20). [Link]
20. Hye Jung Cho, Young Jae Kim, **Young Soo Joung**, Jae Yong Lee, "Fuel Cell Cartridge Having Residual Fuel Measuring Unit and Method of Measuring Residual Fuel of Fuel Cell System Having the Same," **US Patent: US8349487**, (2013-01-08). [Link]
21. Hu Lei, Young Jae Kim, Hye Jung Cho, Jae Yong Lee, **Young Soo Joung**, "Hybrid Voltage Supply Apparatus, Method of Controlling the Same, and Electronic System Employing the Same as Power Supply," **US Patent: US8153313**, (2012-04-10). [Link]
22. Young Jae Kim, Lee Jae Yong, Jin Ho Kim, Hye Jung Cho, Hu Lei, **Young Soo Joung**, "Fuel Cell System and Method of Operating the Same," **China Patent: CN101165958**, (2011-12-07). [Link]
23. **Young Soo Joung**, Hye Jung Cho, Jae Yong Lee, Young Jae Kim, "Fuel Cell System Having Pressurizing System,"

US Patent #: US8012649, (2011-09-06). [Link]

24. **Young Soo Joung**, Hye Jung Cho, Hu Lei, Jae Yong Lee, Young Jae Kim, Jin Ho Kim, "Fuel Cell System and Method of Operating the Same," US 20080311440 A1, 12/2008. [Link]
25. Ji Rae Kim, Young Jae Kim, Jin Ho Kim, **Young Soo Joung**, "Fuel Cell System Capable of Supplying Power of Various Levels and Method of Operating the Same," US 2009/0042073 A1, 07/2008. [Link]

▪ PRESENTATIONS

1. Hyunji Myung, Soonjong Roh, Gahee Kim, Youngri Ryu, **Young Soo Joung**, "Toxicity Assessment of Cooking on Human Lung Cells Based on Cooking Temperature and Food Ingredients," 2024 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 07/2024.
2. Hyun Jung Lee, Neung Hwan Yim, **Young Soo Joung** and Yoon Young Kim, "Dimension Reduction of Mechanism Ground Structures based on Spring-Connected Rigid Block Model Using Variational Autoencoder," *2023 KSME Annual Meeting*, 11/2023.
3. Subin Han, Hyunji Myung, **Young Soo Joung**, "Evaluation of Survival Rates of Pathogenic Bacteria in Various Porous Structures of Particulate Matter, Society of Toxicology," *62nd Annual Meeting and ToxExpo*, Nashville, Tennessee, USA, 03/2023.
4. Subin Han, Hyunji Myung, **Young Soo Joung**, "Evaluation of Survival Rates of Pathogenic Bacteria in Various Porous Structures of Particulate Matter," *12th National Congress on Fluids Engineering,* Chang-won, 06/2022.
5. Subin Han, Hyunji Myung, **Young Soo Joung**, "Effect of Physical Properties of Saliva Residue on Pro-longation of Microbial Survival," 12th National Congress on Fluids Engineering, *Chang-won,* 06/2022.
6. Subin Han, Seunghyeon Lee, **Young Soo Joung**, "Investigation of Bacteria Bubbles using Schlieren Imaging to Reveal the Effect of Bacteria Wettability on Bacterial Enrichment in Bubble Films," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
7. Younglee Ryu, Sunjong Noh, Youjung Kim, **Young Soo Joung**, "Effect of Particulate Matter on Bacterial Survival in Human Respiratory Droplets," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
8. Sunjong Noh, Younglee Ryu, Dokyung Kim, **Young Soo Joung**, "Effects of Cooking Oil Fumes(COFs) Generated at Different Temperatures on the Inflammation of Human Lung Cells," 2021 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2021.
9. **Young Soo Joung**, "New understanding of Bioaerosol Generation, Transmission, and Control with New Approaches Based on Mechanical Engineering," 11th National Congress on Fluids Engineering, *Jeju island,* 08/2020.
10. Sunjong Noh, Hyunji Myung, Seungjun Kim, **Young Soo Joung**, "Inflammatory Response in Lungs Caused by Particulate Matter Produced from Carbon Black and Benzo[a]pyrene," 2020 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2020.
11. Hyunji Myung, Subin Han, and **Young Soo Joung,** "Impact of Particulate Matter on airborne bacterial viability," 2019 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2019.
12. Jiyun Kim, Hyunjung Lee, and **Young Soo Joung,** "Antifouling Fabric Resisting Bacterial Droplets," 2019 *Conference of Korean Association for Particle and Aerosol Research, Yong Pyong,* 06/2019.
13. **Young Soo Joung,** "Bacterial Viability in Residues Formed by Droplet Evaporation," *Educational Seminar for Bio-Pathogenic Fine Particulate Matters, Yonsei University,* 04/2019.
14. **Young Soo Joung,** "Electrophoretic Deposition for the Development of Bio-compatible Hydrogel-CNT Composites," *2019 Spring Conference of Korean Chemical Society, Suwon,* 04/2019.
15. **Young Soo Joung,** "Methods for the Reduction of Pressure Drop in Pipe Flows," *Korea Energy Congress Spring Conference, Jeju Island,* 04/2018.
16. **Young Soo Joung** , "Bioaerosol: Generation, Transmission, Viability, and Control," *Yonsei University,* 12/2017.
17. **Young Soo Joung** , "New Understandings of Transferring Microbes through Bioaerosols from Soil and Water, and Assessments for the Prevention of Agricultural Blights Based on It," *KIST in Gangneung,* 12/2017.
18. **Young Soo Joung** , "Bioaerosol Technologies of Anti-bacterial for Plant Factories," Symposium for the technologies of City Farm, 1/2017.
19. **Young Soo Joung**, Zhifei Ge, Cullen R. Buie, "Drop Impingement Induced Dispersal of Microorganisms and Contaminants Within Porous Media," *the 67th Annual Meeting of the APS Division of Fluid Dynamics,* 11/2014. [Link]
20. **Young Soo Joung,** Jeffrey Moran, Andrew Jones, Eric Bailey and Cullen R. Buie, "A Microfluidic Platform for Interfacial Electrophoretic Deposition," *the 67th Annual Meeting of the APS Division of Fluid Dynamics,* 11/2014. [Link]
21. **Young Soo Joung**, Robert Butler Ramirez, and Cullen R. Buie, "Conductive Hydrogel Produced by Electrophoretic Deposition at the Interface of Two Immiscible Liquids," *American Institute of Chemical Engineers Annual Meeting*, 11/2014. [Link]
22. **Young Soo Joung**, "Electrophoretic Deposition and Breakdown Anodization for Multi-scale Structured Surfaces," North Carolina State University, 03/2014. [Link]
23. **Young Soo Joung**, Robert Ramirez, Cullen R. Buie, "Conductive Hydrogel Produced by Electrophoretic Deposition at

the Interface of Two Immiscible Liquids," ASME 2014 3rd Global Congress on NanoEngineering for Medicine and Biology, 02/2014. [Link]

24. **Young Soo Joung**, Bruno Michel Figliuzzi, Cullen R. Buie, "Design of Capillary Flows with Spatially Graded Porous Films," *the 66th Annual Meeting of the APS Division of Fluid Dynamics,* 11/2013. [Link]
25. **Young Soo Joung**, Cullen R. Buie, "Sparkling Droplets: Aerosol Dispersion Resulting from Drop Impingement on Porous Surfaces," *the 66th Annual Meeting of the APS Division of Fluid Dynamics,* 11/2013. [Link]
26. **Young Soo Joung**, Cullen R. Buie, "Electrophoretic Deposition of Polymerically Stabilized Silica Nanoparticles for Anti-wetting Fabrics," *the 224th ECS meeting,* 10/2013. [Link]
27. **Young Soo Joung**, Cullen R. Buie, "The Role of Surfactants for Dispersion of Carbon Nanotubes in Aqueous Solutions," *the 224th ECS meeting,* 10/2013. [Link]
28. **Young Soo Joung**, Cullen R. Buie, "Electro-fabrication Methods for Multi-scale Structured Surfaces," Material Processing Center and Center for Materials Science and Engineering, MIT, 06/2013.
29. **Young Soo Joung**, Cullen R. Buie, "Functionally Structured Porous Films by Anodization Instability for Capillary Flow Design," *the 5th International Conference on Porous Media & Annual Meeting*, 05/2013. [Link]
30. **Young Soo Joung**, Cullen R. Buie, "Hybrid Electrophoretic Deposition with Anodization Process for Superhydrophilic Surfaces to Enhance Critical Heat Flux," *2011 Electrophoretic Deposition conference,* 10/2011. [Link]
31. **Young Soo Joung,** Cullen R. Buie, "Electrophoretic Deposition," Electrochemical Energy Laboratory, MIT, 08/2011.
32. **Young Soo Joung,** Cullen R. Buie, "Electrophoretic Deposition for Superhydrophobic Surfaces," Micro and Nano seminar, MIT, 03/2011.
33. **Young Soo Joung**, Young Sung Na, Hye Jung Cho, "Development of a Novel Fuel Delivery System for Direct Methanol Fuel Cell Systems, 2008 Samsung TRIZ conference, 11/2008.
34. **Young Soo Joung,** "Topology Design Optimization for Multiphysics Systems," Samsung Advanced Institute of Technology, 10/2005.
35. **Young Soo Joung**, Gil Ho Yoon, Yoon Young Kim, "Lumped Mass Modeling for Local-Mode-Suppressed Element Connectivity Parameterized Topology Optimization of Vibrating Structures," *6th World Congress on Structural and Multidisciplinary Optimization*, 06/2005. [Link]
36. **Young Soo Joung**, Gil Ho Yoon, Yoon Young Kim, "Local Vibration Mode Free Topology Optimization Formulation for Vibrating Structures with Self-Weight Consideration," *Spring Conference Of KSME,* 05/2005.

▪ POSTERS

1. Jeeyoon Kim, Insu Jin and **Young Soo Joung**, "Optimizing Mesoporous TiO_2 Thin Film Pore Structure with Polymer for High-Efficiency Carbon-Based Perovskite Solar Cells," *Global Photovoltaic Conference 2024*, 08/2024.
2. **Young Soo Joung**, Cullen R. Buie, "Porous Titania Thin Film Microfluidic Devices for Medical Diagnostics," *MicroTAS*, 10/2014.
3. Jessamine A. Quijano, **Young Soo Joung**, Cullen R. Buie, and Sharon L. Walker, "Antimicrobial Behavior of Novel Surfaces Generated by Electrophoretic Deposition and Breakdown Anodization," *2013 Colloid and Surface Science Symposium*, 06/2013. [Link]
4. **Young Soo Joung**, Cullen R. Buie, "Dynamic Behaviors of Droplets on Highly Wettable Porous Films," *5th International Conference on Porous Media & Annual Meeting*, 05/2013.
   Note: **Best Poster Award** [Link]
5. **Young Soo Joung**, Cullen R. Buie, "Surface Wettability Alterations by the electrophoretic deposition method," *MIT material day,* 10/2011.
6. Cullen R. Buie, **Young Soo Joung**, Timothy Palmer, "Electrophoretic Deposition of Superhydrophobic Surface Coatings," *the 2010 NSF Minority Faculty Development Workshop Collaborative Research Poster Competition*, 03/2010.
   Note: **Best Poster Award**
7. **Young Soo Joung**, Yoon Young Kim, "The Topology Design Optimization of Cooling Fins Using the Internal Element Connectivity Parameterization Method," *Fall Conference Of KSME,* 11/2005.

▪ TEACHING EXPERIENCE

Sookmyung Women's University since 2017

Instructor for Undergraduate

Fall 2020 - present	**Introduction and Practice of Computer Coding for Artificial Intelligent**
Spring 2018 - present	**Computer Simulation and Design**
Fall 2019, 2020	**Applied Thermal Fluid Engineering**
Spring 2019	**Advanced Mechanical Engineering Technology and Career Exploration**
Fall 2018, 2019	**Heat and Mass Transfer**

Spring 2018 - present	**Fluid Mechanics**
Fall 2017	**Computer Aided Design for Mechanical Engineering**
Spring 2017-2019	**C Programing for Mechanical Engineering**

Instructor for Graduate

Spring 2022	**Finite Element Method**
Fall 2021	**Heat and Mass Transfer**
Spring 2018	**Surface and Interface Science and Engineering**
Fall 2020	**Colloid and Surfactant Science and Engineering**
Spring 2019	**Bioaerosol Science and Technology**
Fall 2018	**Functional Materials for Healthcare Systems**
Spring 2018	**Micro & Nano Technologies for Healthcare Systems**

Massachusetts Institute of Technology: MIT from 2009 to 2017

Spring 2015	**Instructor for "2.006 – Thermal-Fluids Engineering II," MIT** Developed class materials and examinations and delivered four hours of teaching a week
Spring 2014	**Mentor for Undergraduate Research Opportunities Program (UROP), MIT** Advising a UROP student Oluwademilade A Shoyombo, "Porous Thin Film Microfluidic Medical Devices"
Fall. 2013	**Teaching Assistant for "2.05 - Thermodynamics," MIT** Developed class materials and examinations and delivered review sessions and office hours
Jan. 2013	**Completed in the course of the ELS effective teaching workshop**
Sept. 2009–July.2014	**Environmental Health and Safety Representative, MIT** Lab Safety Manager Developed the safety manual and training materials and delivered the lab safety training for the lab members and interns
Summers 2011–2014	**Internship Mentor, MIT** Advised and managed summer internship 2014: Eric Bailey, "Biocompatible Carbon Nanotube Composite Hydrogel Films" 2013: Robert B Ramirez, "Conductive Hydrogel Composite Membranes" 2012: Reitz, Rebecca, "Pulsed Electric Fields for Aqueous Electrophoretic Deposition" 2011: Alexei Bordas, "Electrophoretic Deposition of Electrochemically Active Bacteria for Microbial Fuel Cell Applications"

Samsung Advanced Institute of Technology from 2006 to 2009

Summers 2008–2009	**Internship Mentor, Samsung Advanced Institute of Technology** Advised and managed internship 2009: Sang Ho Yoon, "Fuel Cell Systems Operating with a New Fuel Circulation Method" 2008: Jueun Kim, "Numerical Analysis of the Separation of a Bubbly Flow inside the Recycler for Direct Methanol Fuel Cells"

▪ PROPOSAL WRITING & PROJECT EXPERIENCES

2024–2029	**National Research Foundation of Korea** Title: "Illumination of the Effect of Particulate Matter on the Infection of Pathogens through Aerosols Based on Terahertz Spectroscopy" **PI: Youngsoo Joung**; Status: Funded (2024-2029)
2023–2025	**Korea Technology and Information Promotion Agency for SMEs – DeepTech TIPS** Title: "Illumination of the Effect of Particulate Matter on the Infection of Pathogens through Aerosols Based on Terahertz Spectroscopy" **PI: Youngsoo Joung**; Status: Funded (2023-2025)
2023-2024	**Ministry of Science and ICT** Title: "Artificial Biofilms for Hydrogel Generation" **PI: Youngsoo Joung**; Status: Funded (2023-2024)
2023-2024	**Ministry of Science and ICT** Title: "Copper-infused Hydrogel Patch for Wound Healing" **PI: Youngsoo Joung**; Status: Funded (2023-2024)
2023-2024	**Ministry of Science and ICT** Title: "Psychological Analysis and Management Service Based on Picture Diaries of the Developmental Disorders and the Elderly with Dementia using Artificial Intelligence"

PI: Youngsoo Joung; Status: Funded (2023-2024)

2023-2024 **Ministry of SMEs and Startups**
Title: "Transparent and Flexible Hydrogel Solar Cells for Building-Integrated Photovoltaic and Agricultural Solar Films"
PI: Youngsoo Joung; Status: Funded (2023-2024)

2022-2023 **Ministry of SMEs and Startups**
Title: "Transparent and Flexible Solar Cells Produced by Electrophoretic Deposition of nanoparticle and Hydrogel Electrolyte Film for Building-Integrated Photovoltaic and Agricultural Solar Films"
PI: Youngsoo Joung; Status: Funded (2022-2023)

2021-2023 **Ministry of Agriculture, Food and Rural Affairs**
Title: "Development and Demonstration of nano-coating-based high-efficiency cooling and CO_2 complex supply technology"
PI: Youngsoo Joung; Status: Funded (2021-2023)

2021-2022 **Ministry of Science and ICT**
Title: "Cosmetic Ingredient Analysis Service using Deep-learning OCR"
PI: Youngsoo Joung; Status: Funded (2021-2022)

2021-2022 **Ministry of Science and ICT**
Title: "Customized Nutrition Management Service Application"
PI: Youngsoo Joung; Status: Funded (2020)

2020 **Korea Advanced Institute of Science and Technology**
Title: "Development of Human Droplet Generators"
PI: Youngsoo Joung; Status: Funded (2020)

2020-2021 **Korea Technology & Information Promotion Agency for SMEs**
Title: "Development of flexible and transparent solar cells with durability and beauty for BIPV"
PI: Youngsoo Joung; Status: Funded (2020-2021)

2020 **Ministry of Science and ICT**
Title: "Functional Hydrogel LED mask using Electrophoretic Deposition"
PI: Youngsoo Joung; Status: Funded (2020)

2020-2022 **Ministry of Science and ICT.**
Title: "Development of Commercialization Technologies of (1) Highly-Reliable (2) Colored and Translucent (3) Large-area (4) Flexible Solar Cells Based on Hydrogel Electrolyte Films with Electrodes Prepared by Electrophoretic Deposition for Smart Net-zero Energy Buildings"
PI: Youngsoo Joung; Status: Funded (2020-2022)

2020 **Seoil Casting Co., Ltd.**
Title: "Development of Theoretical Models of Super-nozzles for the Systematic Design and Verification of the Functions"
PI: Youngsoo Joung; Status: Funded (2020)

2019-2021 **Ministry of SMEs and Startups**
Title: "Development of Electrophoretic Deposition Systems for Multi-functional Filters"
PI: Youngsoo Joung; Status: Funded (2019-2021)

2019 **Korea Institute of Energy Research**
Title: "Development of Multi-functional Surfaces of Antibacterial and CO_2 Conversion for the Thermal and Environment Control Units for Smart Farms"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Ministry of SMEs and Startups**
Title: "Development of Electrophoretic Deposition Systems for the Production of Multi-Functional Large Area Filters for Air Conditioning Modules of Closed Type Smart Farm"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Sung-won IND**
Title: "Development of Multi-Functional Photocatalytic Surfaces of heat exchangers for Thermal Environment Control of Smart Farm"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Korean Foundation for the Advancement of Science and Creativity**
Title: "Study on the Effect of Environmental Conditions on the Viability of Bacteria in Bioaerosol"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Ministry of Science and ICT**
Title: "Healthy hydrogel food using Electrophoretic Deposition"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Ministry of Science and ICT**
Title: "A System for Detecting Underwater Bacteria in Real-time Using Bubbles"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **Sookmyung Women's University**

Title: "Development of Anti-wetting and Anti-bacterial Fabrics Using Electrophoretic Deposition"
PI: Youngsoo Joung; Status: Funded (2019)

2019 **National Institute of Horticultural and Herbal Science**
Title: "Development of Fine Powder from Pear Juice"
PI: Youngsoo Joung; Status: Funded (2019)

2018 **Sung-won IND**
Title: "Development of Anti-freezing Cooling Fins for Efficiency Enhancement of Energy Recovery Heat Exchanger"
PI: Youngsoo Joung; Status: Funded (2018)

2018 **Korea Institute of Science and Technology**
Title: "Development of Anti-microbial Fabric for Smart Farm Using Electrophoretic Deposition"
PI: Youngsoo Joung; Status: Funded (2018)

2018 **Korea Institute of Science and Technology**
Title: "Development of Evaluation Methods and Systems for Heat Exchangers using Condensation"
PI: Youngsoo Joung; Status: Funded (2018)

2018–2022 **National Research Foundation of Korea**
Title: "Real-time Detection of Aerosolized Pathogenic Microbes and Development of Prediction Models and Systems for the Infectivity"
PI: Youngsoo Joung; Status: Funded (2018-2022)

2017–2018 **Korea Institute of Energy Research**
Title: "Development of Fabrication Methods and Evaluation Technologies for the Inner Surfaces of Pipes to Enhance the Efficiency of Circulating Water for the District Heating and Cooling"
PI: Youngsoo Joung; Status: Funded (2017-2018)

Spring, 2017 **Korea Institute of Energy Research**
Title: "Development of Fabrication Methods for the Inner Surfaces of Pipes to Enhance the Efficiency of Circulating Water for the District Heating and Cooling"
PI: Youngsoo Joung; Status: Funded (2017)

2014, 2015, 2016 **Chevron Energy Technology Company**
Title: (a) "Electrophoretic Deposition of Nanoscale Surface Coatings for Enhanced Droplet Coalescence" (2015-2016), (b) "Development of High Durability Surface Coatings for Oil/Water Separation Applications" (2015-2016), and (c) "Surface Coatings for Enhancing Coalescence of Water Droplets in Oil Emulsions" (2014-2015)
Contributed significantly: organization of the project directions and plans, writing the draft
PI: Cullen R. Buie; Status: Funded/Active (2014-2016)

2012 **MIT Lincoln Laboratory**
Title: "Electrophoretic Infiltration of Superwicks for Remote Chemical Sampling"
Contributed extensively: proof of concept, providing preliminary data
PI: Cullen R. Buie, Rod Kunz; Status: Funded (2012-2013)

2010, 2011, 2012 **Battelle Memorial Institute**
Title: "Electrophoretic Deposition of Nanoporous Films for Superhydrophobic Surfaces"
Contributed significantly: proof of concept, providing preliminary data, writing the draft
PI: Cullen R. Buie; Status: Funded (2010 – 2013)

▪ AWARDS & HONORS

Apr. 2024 **Excellence Teaching Award**
from Sookmyung Women's University

June 2022 **Best Paper Award**
from 12th National Congress on Fluids Engineering

Feb. 2020 **Excellence Teaching Award**
from Sookmyung Women's University

June 2019 **Best Paper Award**
from Korean Association for Particle and Aerosol Research

May 2013 **Best Poster Award**
from 5th International Conference on Porous Media & Annual Meeting

Mar. 2013 **Sontheimer Award**
from the Mechanical Engineering Department of MIT

May 2012 **Outstanding Environmental Health and Safety Representative Award**

from the Environment Health and Safety Department of MIT

Sept. 2010 **Best Poster Award**
from the National Science Foundation

Sept. 2008 **Strategic Patent Designation**
from Fuel Cell Group of SAIT

Sept. 2007 **Strategic Patent Designation**
from Fuel Cell Group of SAIT

Mar. 2006 **New Employee Award in Samsung**
from Samsung Human Resources Development Center

Feb. 2004 **Outstanding Graduate Award**
by Dean of the Mechanical Engineering Department of Yonsei University

Feb. 2003 **High Honors Student**
from Yonsei University

Aug. 2002 **High Honors Student**
from Yonsei University

▪ LICENSES

Feb. 1999 **Vehicle Overhaul Mechanic,** License #99402022919C
From Human Resources Development Service of Korea

Apr. 1999 **Vehicle Maintenance Mechanic,** License #99403021386Y
From Human Resources Development Service of Korea