

# MOO SUN HONG

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## EDUCATION

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**Massachusetts Institute of Technology, Ph.D.**, Chemical Engineering, 2021

- Thesis: Model-based Design and Control of Biopharmaceutical Manufacturing Processes
- Advisor: Prof. Richard D. Braatz

**Massachusetts Institute of Technology, M.S.**, Chemical Engineering Practice, 2017

**Seoul National University, B.S.**, Chemical and Biological Engineering, 2014

## HONORS AND AWARDS

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**Excellence in Teaching Award**, College of Engineering, SNU, 2023

**Integrated Continuous Biomanufacturing V Outstanding Poster Presentation Award**, ECI, 2022

**PD2M Award for Excellence in Integrated QbD Practice**, AIChE, 2021

**Separations Division Graduate Student Research Award**, AIChE, 2021

**CAST Directors' Student Presentation Awards Finalist**, AIChE, 2021

**Modeling, Control, and Optimization of Manufacturing Systems Session Best Presentation**, AIChE, 2019

**Food, Pharmaceutical & Bioengineering Division Poster Presentation Award**, AIChE, 2019

**Dow Travel Award**, Dow Chemical Company, 2018

**Hanwha Travel Award**, Hanwha Chemical & Hanwha Total, 2018

**Jefferson W. Tester Award**, School of Chemical Engineering Practice, MIT, 2016

**Overseas Ph.D. Scholarship (\$50K/yr)**, ILJU Academy and Culture Foundation, 2014–2018

**Graduated First in Class**, College of Engineering, SNU, 2014

**Presidential Science Scholarship**, Ministry of Science and Technology, 2008–2014

## PROFESSIONAL EXPERIENCE

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**Assistant Professor**, Chemical and Biological Engineering, SNU, Seoul, Korea, 2023–date

**Postdoctoral Associate**, Chemical Engineering, MIT, Cambridge, MA, 2021–2023

**Visiting Research Scientist**, Applied Science and Technology, Politecnico di Torino, Torino, Italy, 2019

## INVITED TALKS

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- [1] Macroscopic modeling of bioreactors for recombinant protein producing *Pichia pastoris* in defined medium. *LabRoots Bioprocessing Virtual Event*, April 8, 2020.
- [2] Model-based control for continuous viral inactivation of biopharmaceuticals. *BioProcess International Europe Conference & Exhibition*, Amsterdam, Netherlands (virtual), July 14, 2020.
- [3] A case study in continuous digital biomanufacturing of monoclonal antibodies. *Continuous Processing in Biopharm Manufacturing, The Bioprocessing Summit*, Boston, MA (virtual), August 25, 2020.
- [4] A case study in continuous digital biomanufacturing of monoclonal antibodies. *Process Characterization & Control, The Bioprocessing Summit*, Boston, MA (virtual), August 28, 2020.

- [5] A case study in applying PAT to the continuous biomanufacturing of monoclonal antibodies. *BioProcess International Conference & Exhibition*, Boston, MA (virtual), September 23, 2020.
- [6] Building a control system pipeline for biopharmaceutical viral inactivation. *MIT Machine Intelligence for Manufacturing and Operations Student Research Forum*, March 4, 2021.
- [7] Model-based control for continuous viral inactivation of biopharmaceuticals. *LabRoots Bioprocessing Virtual Event*, April 7, 2021.
- [8] Mechanistic modeling and parameter-adaptive nonlinear model predictive control of a microbioreactor. *Bioproduction: Scale, Bioreactors & Digitalization, The Bioprocessing Summit*, Boston, MA, August 19, 2021.
- [9] School of Chemical and Biological Engineering, SNU, Seoul, Korea (virtual), January 6, 2022.
- [10] Process modeling and control of digital biopharmaceutical manufacturing. *Process Control, Optimization, and Data Analytics Young Researcher Online Seminar Series, IEEE CSS TC on Process Control*, January 26, 2022.
- [11] Process modeling and control of digital biopharmaceutical manufacturing. *Smart Digital Engineering Professionals Training Course*, Engineering Development Research Center, SNU, Seoul, Korea (virtual), February 15, 2022.
- [12] Biological validation of column-based continuous viral inactivation. *BioProcess International Europe Conference & Exhibition*, Vienna, Austria (virtual), May 18, 2022.
- [13] Smart Process analytics for the prediction of critical quality attributes in end-to-end batch manufacturing of monoclonal antibodies. *BioProcess International Asia*, April 20, 2023.
- [14] ST PHARM, Ansan, Korea, April 20, 2023.
- [15] Optimal design and control of advanced biomanufacturing systems, *KSIEC Spring Meeting*, Jeju, Korea, May 11, 2023.
- [16] Department of Biological Engineering, Inha University, Incheon, Korea, May 31, 2023.
- [17] Optimal design and control of advanced biomanufacturing systems, *Advanced Biopharmaceutical Continuous (ABC) Process Workshop*, Incheon, Korea, July 7, 2023.
- [18] Department of Chemical Engineering and Materials Science, Ewha Womans University, Seoul, Korea, June 26, 2023.
- [19] CJ Cheiljedang, Suwon, Korea, July 5, 2023.
- [20] School of Chemical Engineering, Sungkyunkwan University, Suwon, Korea, July 13, 2023.
- [21] Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, August 7, 2023.
- [22] Smart process analytics for the prediction of critical quality attributes in end-to-end batch manufacturing of monoclonal antibodies, *Smart Biomanufacturing & Digitalization, The Bioprocessing Summit*, Boston, MA, August 17, 2023.
- [23] Model-based design and control of biopharmaceutical manufacturing processes. *SNU-UTokyo Joint Symposium on Chemical Engineering*, Tokyo, Japan, August 21, 2023.
- [24] Smart process analytics for the prediction of critical quality attributes in end-to-end batch manufacturing of monoclonal antibodies, *BioTalk EU*, Berlin, Germany, September 20, 2023.
- [25] ILJU Academy and Culture Foundation, Seoul, Korea, November 2, 2023.
- [26] Department of Chemical and Biomolecular Engineering, Yonsei University, Seoul, Korea, December 7, 2023.

## **PUBLICATIONS** ([Google Scholar](#))

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† Equal contribution; \* Corresponding author.

### **Journal Papers**

- [1] G. Tian, S. L. Lee, X. Yang, **M. S. Hong**, Z. Gu, S. Li, R. Fisher, and T. F. O'Connor\*. A dimensionless analysis of residence time distributions for continuous powder mixing. *Powder Technology*, 315:332-338, 2017. <https://doi.org/10.1016/j.powtec.2017.04.007>
- [2] **M. S. Hong**, K. A. Severson, M. Jiang, A. E. Lu, J. C. Love, and R. D. Braatz\*. Challenges and opportunities in biopharmaceutical manufacturing control. *Computers & Chemical Engineering*, 110:106-114, 2018. <https://doi.org/10.1016/j.compchemeng.2017.12.007>
- [3] **M. S. Hong**, W. Sun, A. E. Lu, and R. D. Braatz\*. Process analytical technology and digital biomanufacturing of monoclonal antibodies. *American Pharmaceutical Review*, 23(6):122-125, 2020 (invited).
- [4] **M. S. Hong** and R. D. Braatz\*. Mechanistic modeling and parameter-adaptive nonlinear model predictive control of a microbioreactor. *Computers & Chemical Engineering*, 147:107255, 2021. <https://doi.org/10.1016/j.compchemeng.2021.107255>
- [5] **M. S. Hong**, M. L. Velez-Suberbie, A. J. Maloney, A. Biedermann, K. R. Love, J. C. Love, T. K. Mukhopadhyay, and R. D. Braatz\*. Macroscopic modeling of bioreactors for recombinant protein producing *Pichia pastoris* in defined medium. *Biotechnology & Bioengineering*, 118(3):1199-1212, 2021. <https://doi.org/10.1002/bit.27643>
- [6] **M. S. Hong**, K. Kaur, N. Sawant, S. B. Joshi, D. B. Volkin, and R. D. Braatz\*. Crystallization of a non-replicating rotavirus vaccine candidate. *Biotechnology & Bioengineering*, 118(4):1750-1756, 2021. <https://doi.org/10.1002/bit.27699>
- [7] A. Gimpel, G. Katsikis, S. Sha, A. J. Maloney, **M. S. Hong**, T. N. T. Nguyen, J. Wolfrum, S. L. Springs, A. J. Sinskey, S. Manalis, P. W. Barone, and R. D. Braatz\*. Analytical methods in support of process development for recombinant adeno-associated virus-based gene therapy. *Molecular Therapy — Methods & Clinical Development*, 20:740-754, 2021. <https://doi.org/10.1016/j.omtm.2021.02.010>
- [8] N. J. Mozdzierz†, Y. Lee†, **M. S. Hong**†, M. H. P. Benisch, M. L. Rasche, U. E. Tropp, M. Jiang, A. S. Myerson, and R. D. Braatz\*. Mathematical modeling and experimental validation of continuous slug-flow tubular crystallization with ultrasonication-induced nucleation and spatially varying temperature. *Chemical Engineering Research and Design*, 169:275-287, 2021. <https://doi.org/10.1016/j.cherd.2021.03.026>
- [9] T. N. T. Nguyen, S. Sha, **M. S. Hong**, A. J. Maloney, P. W. Barone, C. Neufeld, J. Wolfrum, S. L. Springs, A. J. Sinskey, and R. D. Braatz\*. Mechanistic model for production of recombinant adeno-associated virus via triple transfection of HEK293 cells. *Molecular Therapy—Methods & Clinical Development*, 21:642-655, 2021. <https://doi.org/10.1016/j.omtm.2021.04.006>
- Featured on the cover.
- [10] **M. S. Hong**†, A. E. Lu†, R. W. Ou, J. Wolfrum, S. L. Spring, A. J. Sinskey, and R. D. Braatz\*. Model-based control for column-based continuous viral inactivation of biopharmaceuticals. *Biotechnology & Bioengineering*, 118(8): 3215–3224, 2021. <https://doi.org/10.1002/bit.27846>
- Featured in *Genetic Engineering & Biotechnology News*, 40(S6):S13-S15, 2020. <https://doi.org/10.1089/gen.40.S6.05>
- [11] **M. S. Hong**, A. E. Lu, A. J. Maloney, R. W. Ou, J. M. Wolfrum, S. L. Springs, A. J. Sinskey, and R. D. Braatz\*. Applying PAT to the continuous digital biomanufacturing of monoclonal antibodies. *Pharma Focus Asia*, 44:42-46, 2021 (invited).
- [12] N. J. Mozdzierz, **M. S. Hong**, Y. Lee, M. Jiang, A. S. Myerson, and R. D. Braatz\*. Tunable protein crystal size distribution via continuous slug-flow crystallization with spatially varying temperature. *CrystEngComm*, 23(37):6495-6505, 2021. <https://doi.org/10.1039/D1CE00387A>
- Featured on the cover.
- [13] **M. S. Hong**, A. E. Lu, J. Bae, J. M. Lee, and R. D. Braatz\*. A droplet-based evaporative system for the estimation of protein crystallization kinetics. *Crystal Growth & Design*, 21(11):6064-6075, 2021. <https://doi.org/10.1021/acs.cgd.1c00231>
- [14] P. R. Jeon, **M. S. Hong**, and R. D. Braatz\*. Compact neural network modeling of nonlinear dynamical systems via the standard nonlinear operator form. *Computers & Chemical Engineering*, 159:107674, 2022. <https://doi.org/10.1016/j.compchemeng.2022.107674>

- [15] A. Nikolakopoulou†, **M. S. Hong**†, and R. D. Braatz\*. Dynamic state feedback controller and observer design for dynamic artificial neural network models. *Automatica*, 146:110622, 2022. <https://doi.org/10.1016/j.automatica.2022.110622>
- [16] **M. S. Hong**, W. Sun, B. W. Anthony, and R. D. Braatz\*. Teaching process data analytics and machine learning at MIT. *Chemical Engineering Education*, 56(4):226-230, 2022. <https://doi.org/10.18260/2-1-370.660-130947>
- [17] P. Srisuma, A. Pandit, Q. Zhang, **M. S. Hong**, J. Gamekkanda, F. Fachin, N. Moore, D. Djordjevic, M. Schwaerzler, T. Oyetunde, W. Tang, A. Myerson, G. Barbastathis, and R. D. Braatz\*. Thermal imaging-based state estimation of a Stefan problem with application to cell thawing. *Computers & Chemical Engineering*, 173:108179, 2023. <https://doi.org/10.1016/j.compchemeng.2023.108179>
- [18] **M. S. Hong**†, F. Mohr†, C. D. Castro, B. T. Smith, J. M. Wolfrum, S. L. Springs, A. J. Sinskey, R. A. Hart, T. Mistretta, and R. D. Braatz\*. Smart process analytics for the end-to-end batch manufacturing of monoclonal antibodies. *Computers & Chemical Engineering*, 179:108445, 2023. <https://doi.org/10.1016/j.compchemeng.2023.108445>
- [19] J.Rhyu, D. Bozinovski, A. B. Dubs, N. Mohan, E. M. Cummings Bende, A. J. Maloney, M. Nieves, J. Sangerman, A. E. Lu, **M. S. Hong**, A. Artamonova, R. W. Ou, P. W. Barone, J. C. Leung, J. M. Wolfrum, A. J. Sinskey, S. L. Springs, and R. D. Braatz\*. Automated outlier detection and estimation of missing data. *Computers & Chemical Engineering*, 180:108448, 2024. <https://doi.org/10.1016/j.compchemeng.2023.108448>
- [20] F. Mohr†, **M. S. Hong**†, C. D. Castro, B. T. Smith, J. M. Wolfrum, S. L. Springs, A. J. Sinskey, R. A. Hart, T. Mistretta, and R. D. Braatz\*. Tensorial approaches combining timeseries and batch data for the end-to-end batch manufacturing of monoclonal antibodies. *Computers & Chemical Engineering*, accepted.

## Patents

- [1] R. D. Braatz, A. E. Lu, and **M. S. Hong**. Model-based control for column-based continuous viral inactivation of biopharmaceuticals. W.O. Patent Publication No. WO/2021/222735, April 11, 2021. U.S. Patent Publication No. 2023/0167417 A1, June 1, 2023.

## Proceeding Papers

- [1] **M. S. Hong**, K. A. Severson, M. Jiang, A. E. Lu, J. C. Love, and R. D. Braatz. Challenges and opportunities in biopharmaceutical manufacturing control, Sessions on Grand Challenges. *Proceedings of the Foundations of Computer Aided Process Operations / Chemical Process Control*, Paper 117, 2017.
- [2] A. Nikolakopoulou, **M. S. Hong**, and R. D. Braatz. Feedback control of dynamic artificial neural networks using linear matrix inequalities. *Proceedings of the IEEE Conference on Decision and Control*, 2210-2215, 2020. <https://doi.org/10.1109/CDC42340.2020.9303770>
- [3] A. Nikolakopoulou, **M. S. Hong**, and R. D. Braatz. Output feedback control and estimation of dynamic artificial neural networks using linear matrix inequalities. *Proceedings of the American Control Conference*, 2613-2618, 2021. <https://doi.org/10.23919/ACC50511.2021.9483286>

## Meeting Abstracts

- [1] G. Tian, X. Yang, S. Lee, R. Fisher, S. Li, **M. S. Hong**, Z. Gu, and T. O'Connor. A novel analysis of residence time distributions for continuous powder mixing. *AIChE Annual Meeting*, San Francisco, CA, November 13–18, 2016. Abstract 342g.
- [2] **M. S. Hong** and R. D. Braatz. Mechanistic modeling and parameter-adaptive nonlinear model predictive control of a microbioreactor. *AIChE Annual Meeting*, Pittsburg, PA, October 28–November 1, 2018. Abstract 667e.
- [3] Y. Lee, N. J. Mozdzierz, **M. S. Hong**, R. D. Braatz, and W. B. Lee. Mathematical modeling and parameter estimation of continuous tubular crystallizer. *KIChE Spring Meeting*, Jeju, Korea, April 24–26, 2019. Abstract 174.
- [4] **M. S. Hong**, A. E. Lu, and R. D. Braatz. A systematic model-based approach for the design and control of protein crystallization. *AIChE Annual Meeting*, Orlando, FL, November 10–15, 2019. Abstract 29d. **Session Best Presentation.**
- [5] **M. S. Hong**, M. L. Velez-Suberbie, A. J. Maloney, A. Biedermann, K. R. Love, J. C. Love, T. K. Mukhopadhyay, and R. D. Braatz. Macroscopic modeling of bioreactors for recombinant protein producing *Pichia pastoris* in defined medium. *AIChE Annual Meeting*, Orlando, FL, November 10–15, 2019. Abstract 175am.

- [6] **M. S. Hong**, A. E. Lu, J. Bae, J. M. Lee, and R. D. Braatz. A droplet-based evaporative crystallization system for protein crystallization Kinetics Estimation. *AIChE Annual Meeting*, Orlando, FL, November 10–15, 2019. Abstract 558cd.
- [7] **M. S. Hong** and R. D. Braatz. Optimal design and control of advanced biomanufacturing systems. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 3ci.
- [8] E. M. Cummings Bende, A. J. Maloney, D. Bozinovski, J. Sangerman, A. E. Lu, **M. S. Hong**, N. Persits, A. Artamonova, R. W. Ou, W. Sun, J. Wolfrum, P. W. Barone, R. J. Ram, S. Spring, R. D. Braatz, and A. J. Sinskey. Process development, characterization, and understanding in an integrated continuous monoclonal antibody manufacturing testbed. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 8e.
- [9] A. Gimpel, G. Katsikis, S. Sha, A. J. Maloney, **M. S. Hong**, T. Nguyen, J. Wolfrum, S. Springs, A. J. Sinskey, S. Manalis, P. W. Barone, and R. D. Braatz. Process analytical technologies for recombinant adeno-associated virus-based gene therapy. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 157aa.
- [10] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Digitalization of biopharmaceutical manufacturing. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 195e.
- [11] A. J. Maloney, E. M. Cummings Bende, D. Bozinovski, A. E. Lu, J. Sangerman, **M. S. Hong**, A. Artamonova, R. W. Ou, W. Sun, N. Persits, R. J. Ram, J. Wolfrum, P. W. Barone, S. Spring, A. J. Sinskey, and R. D. Braatz. Process control strategy development for an integrated continuous platform for monoclonal antibody manufacturing. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 367d.
- [12] **M. S. Hong**, A. E. Lu, A. J. Maloney, E. M. Cummings Bende, D. Bozinovski, J. Sangerman, A. Artamonova, R. W. Ou, P. W. Barone, J. Wolfrum, S. Spring, A. J. Sinskey, and R. D. Braatz. First-principles dynamic simulation of an integrated continuous biomanufacturing platform. *AIChE Annual Meeting*, San Francisco, CA (virtual), November 15–20, 2020. Abstract 542e.
- [13] **M. S. Hong**. Optimal design and control of advanced biomanufacturing systems. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 4fl.
- [14] **M. S. Hong**, A. E. Lu, J. Bae, J. M. Lee, and R. D. Braatz. Design and control of novel droplet-based system for estimating protein crystallization kinetics. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 182a.
- [15] W. Sun, F. Mohr, P. R. Jeon, **M. S. Hong**, and R. D. Braatz. Smart process analytics and machine learning. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 259e.
- [16] D. M. Bozinovski, E. M. Cummings Bende, A. J. Maloney, J. Sangerman, A. B. Dubs, A. E. Lu, **M. S. Hong**, N. Persits, A. Artamonova, R. W. Ou, W. Sun, J. Wolfrum, P. W. Barone, R. J. Ram, S. L. Spring, R. D. Braatz, and A. J. Sinskey. Biomanufacturing and testbed development for the continuous production of monoclonal antibodies. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 293c.
- [17] **M. S. Hong**, A. E. Lu, R. W. Ou, J. Wolfrum, S. L. Spring, A. J. Sinskey, and R. D. Braatz. Model-based control for column-based continuous viral inactivation of biopharmaceuticals. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 493c.
- [18] R. D. Braatz, **M. S. Hong**, A. E. Lu, and W. Sun. Keynote talk: Integrated quality by design in (bio)pharmaceutical manufacturing. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 541d.
- [19] **M. S. Hong** and R. D. Braatz. Process modeling and control of digital biopharmaceutical manufacturing. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 584a.
- [20] T. N. T. Nguyen, S. Sha, J. Sangerman, **M. S. Hong**, J. Ng, P. W. Barone, C. Neufeld, J. Wolfrum, S. L. Springs, A. J. Sinskey, and R. D. Braatz. *ACS Spring*, San Diego, CA, March 20–24, 2022. Abstract #3652485.
- [21] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Plug-and-play software for mechanistic modelling of end-to-end continuous manufacturing of monoclonal antibodies. *ACS Spring*, San Diego, CA, March 20–24, 2022. Abstract #3653870.
- [22] D. M. Bozinovski, E. M. Cummings Bende, A. J. Maloney, J. Sangerman, A. Dubs, A. E. Lu, **M. S. Hong**, A. Artamonova, R. W. Ou, W. Sun, J. Wolfrum, P. W. Barone, S. L. Springs, R. D. Braatz, and A. J. Sinskey. *ACS Spring*, San Diego, CA, March 20–24, 2022. Abstract #3661909.

- [23] S. H. Kim, **M. S. Hong**, J. H. Lee, and R. D. Braatz. Multiscale computational fluid dynamics method for slug flow reactor simulation. *AIChE Annual Meeting*, Phoenix, AZ, November 13–18, 2022. Abstract 206g.
- [24] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Plug-and-play software for mechanistic modelling of end-to-end continuous manufacturing of monoclonal antibodies. *AIChE Annual Meeting*, Phoenix, AZ, November 13–18, 2022. Abstract 411a.
- [25] **M. S. Hong**, F. Mohr, C. Castro, T. Mistretta, R. A. Hart, B. Smith, and R. D. Braatz. Smart process analytics for the prediction of critical quality attributes in end-to-end batch manufacturing of monoclonal antibodies. *AIChE Annual Meeting*, Phoenix, AZ, November 13–18, 2022. Abstract 567e.
- [26] J. Rhyu, D. Bozinovski, A. B. Dubs, N. Mohan, E. M. Cummings Bende, A. J. Maloney, M. Nieves, J. Sangerman, A. E. Lu, **M. S. Hong**, A. Artamonova, R. W. Ou, P. W. Barone, J. C. Leung, J. Wolfrum, A. J. Sinskey, S. L. Springs, and R. D. Braatz. Automated outlier detection and estimation of missing data. *FOPAM (Foundations of Process/product Analytics and Machine Learning)*, Davis, CA, July 30–August 3, 2023. Poster 7.
- [27] A. Dighe, V. Bal, A. Eren, D. R. R. Weerakkodige, J. Yadav, **M. S. Hong**, P. W. Barone, S. L. Springs, A. J. Sinskey, A. S. Myerson, and R. D. Braatz. Recent advances and current directions in downstream processing for biotherapeutics. *AIChE Annual Meeting*, Orlando, FL, November 5–10, 2023. Abstract 55a.
- [28] J. Rhyu, D. Bozinovski, A. B. Dubs, N. Mohan, E. M. Cummings Bende, A. J. Maloney, M. Nieves, J. Sangerman, A. E. Lu, **M. S. Hong**, A. Artamonova, R. W. Ou, P. W. Barone, J. C. Leung, J. Wolfrum, A. J. Sinskey, S. L. Springs, and R. D. Braatz. Automated outlier detection and estimation of missing data. *AIChE Annual Meeting*, Orlando, FL, November 5–10, 2023. Abstract 268b.
- [29] A. Pandit, Q. Zhang, **M. S. Hong**, W. Tang, C. D. Papageorgiou, N. Nazemifard, Y. Yang, M. Schwaerzler, T. Oyetunde, C. Mitchell, R. D. Braatz, G. Barbastathis, and A. S. Myerson. Laser speckle probe for monitoring pharmaceutical drying. *AIChE Annual Meeting*, Orlando, FL, November 5–10, 2023. Abstract 583b.

## PRESENTATIONS

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- [1] **M. S. Hong** and R. D. Braatz. Mechanistic modeling and parameter-adaptive nonlinear model predictive control of a microbioreactor. *Pharmaceutical Discovery, Development & Manufacturing Forum, AIChE Annual Meeting*, Pittsburg, PA, November 1, 2018.
- [2] **M. S. Hong** and R. D. Braatz. Mechanistic modeling and parameter-adaptive nonlinear model predictive control of a microbioreactor. *BioMAN Summit: Driving Innovation in Cell and Gene Therapy Manufacturing*, Cambridge, MA, December 11, 2018 (poster).
- [3] **M. S. Hong**, A. E. Lu, and R. D. Braatz. A systematic model-based approach for the design and control of protein crystallization. *Computing & Systems Technology Division, AIChE Annual Meeting*, Orlando, FL, November 10, 2019.
- [4] **M. S. Hong**, M. L. Velez-Suberbie, A. J. Maloney, A. Biedermann, K. R. Love, J. C. Love, T. K. Mukhopadhyay, and R. D. Braatz. Macroscopic modeling of bioreactors for recombinant protein producing *Pichia pastoris* in defined medium. *Food, Pharmaceutical & Bioengineering Division, AIChE Annual Meeting*, Orlando, FL, November 11, 2019 (poster).
- [5] **M. S. Hong**, A. E. Lu, J. Bae, J. M. Lee, and R. D. Braatz. A droplet-based evaporative crystallization system for protein crystallization kinetics estimation. *General Poster Session, AIChE Annual Meeting*, Orlando, FL, November 13, 2019 (poster).
- [6] **M. S. Hong**, A. E. Lu, A. J. Maloney, E. M. Cummings Bende, D. Bozinovski, J. Sangerman, A. Artamonova, R. W. Ou, P. W. Barone, J. Wolfrum, S. Spring, A. J. Sinskey, and R. D. Braatz. First-principles dynamic simulation of an integrated continuous biomanufacturing platform. *Pharmaceutical Discovery, Development & Manufacturing Forum, AIChE Annual Meeting*, San Francisco, CA (virtual), November 18, 2020.
- [7] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Digitalization of biopharmaceutical manufacturing. *Next-Gen Manufacturing, AIChE Annual Meeting*, San Francisco, CA (virtual), November 20, 2020.
- [8] **M. S. Hong**, A. E. Lu, R. W. Ou, J. Wolfrum, S. L. Spring, A. J. Sinskey, and R. D. Braatz. Model-based control for continuous viral inactivation of biopharmaceuticals. *BioMAN Spring Workshop: Data Analytics along the Biomanufacturing Life Cycle*, May 19, 2021 (poster).

- [9] **M. S. Hong**, A. E. Lu, J. Bae, J. M. Lee, and R. D. Braatz. Design and control of novel droplet-based system for estimating protein crystallization kinetics. *Computing & Systems Technology Division, AIChE Annual Meeting*, Boston, MA, November 8, 2021.
- [10] **M. S. Hong**, A. E. Lu, R. W. Ou, J. Wolfrum, S. L. Spring, A. J. Sinskey, and R. D. Braatz. Model-based control for column-based continuous viral inactivation of biopharmaceuticals. *Separations Division, AIChE Annual Meeting*, Boston, MA, November 10, 2021.
- [11] **M. S. Hong** and R. D. Braatz. Process modeling and control of digital biopharmaceutical manufacturing. *Pharmaceutical Discovery, Development & Manufacturing Forum, AIChE Annual Meeting*, Boston, MA, November 11, 2021.
- [12] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Plug-and-play software for mechanistic modelling of end-to-end continuous manufacturing of monoclonal antibodies. *Division of Biochemical Technology, ACS Spring*, San Diego, CA, March 22, 2022.
- [13] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Plug-and-play software for mechanistic modelling of end-to-end continuous manufacturing of monoclonal antibodies. *Integrated Continuous Biomanufacturing V*, Sitges, Spain, October 10, 2022 (poster).
- [14] **M. S. Hong**, A. E. Lu, and R. D. Braatz. Plug-and-play software for mechanistic modelling of end-to-end continuous manufacturing of monoclonal antibodies. *Pharmaceutical Discovery, Development & Manufacturing Forum, AIChE Annual Meeting*, Phoenix, AZ, November 15, 2022.
- [15] **M. S. Hong**, F. Mohr, C. Castro, T. Mistretta, R. A. Hart, B. Smith, and R. D. Braatz. Smart process analytics for the prediction of critical quality attributes in end-to-end batch manufacturing of monoclonal antibodies. *Pharmaceutical Discovery, Development & Manufacturing Forum, AIChE Annual Meeting*, Phoenix, AZ, November 16, 2022.
- [16] **M. S. Hong** and R. D. Braatz. Model-based design and control of biopharmaceutical manufacturing processes. *Control and Estimation Application for Bioprocesses, ICCAS*, Yeosu, Korea, October 19, 2023.

## **RESIDENT INSTRUCTION**

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### **Supervision of Undergraduate Students**

- Young Hyun Cho, Hyeon Jun Kim, Taehyeon Kim, Si Yang Park

### **Supervision of Postdoctoral Fellows/Research Associates**

- Yoon Young Choi

### **Service on Ph.D. Examination Committees**

- Dongju Kang (Chemical and Biological Engineering), Sunkyu Shin (Chemical and Biological Engineering), Jae Jung Urm (Chemical and Biological Engineering), Seung Jae Kwak (Chemical and Biological Engineering)

### **Courses Taught**

- Process and Product Design (458.401, undergraduate), Spring 2023, Spring 2024
- Separation Processes (458.407, undergraduate), Fall 2023
- Digital Computer Concept and Practice (035.001, undergraduate), Spring 2024

## **SERVICE (PUBLIC, PROFESSIONAL/DISCIPLINARY, AND UNIVERSITY)**

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### **Korean Institute of Chemical Engineers (KIChE)**

- Member, 2014–date
- Process Systems Engineering Division, 2023–date
- Academic Secretary, Process Systems Engineering Division, 2024
- Research and Development Committee, 2024–2025
- Chair, Process Systems Engineering II, *KIChE Fall Meeting and International Symposium*, Daejeon, Korea, October 27, 2023.

### **American Institute of Chemical Engineers (AIChE)**

- Member, 2018–date
- Judge, Undergraduate Poster Competition, *AIChE Annual Meeting*, Boston, MA, November 8, 2021
- Judge, Division 15 Poster Competition, *AIChE Annual Meeting*, Boston, MA, November 8, 2021
- Co-chair, Crystallization in Process Development, *Separations Division, AIChE Annual Meeting*, Phoenix, AZ, November 16, 2022
- Judge, Undergraduate Poster Competition, *AIChE Annual Meeting*, Orlando, FL, November 5, 2023

### **International Federation of Automatic Control (IFAC)**

- Affiliate, 2020–date
- Technical Committee on Distributed Parameter Systems (TC 2.6), 2020–date
- Technical Committee on Chemical Process Control (TC 6.1), 2021–date
- Technical Committee on Biological and Medical Systems (TC 8.2), 2021–date

### **American Chemical Society (ACS)**

- Member, 2022–date
- Biochemical Technology (BIOT) Division, 2022–date

### **Korean Society of Industrial and Engineering Chemistry (KSIEC)**

- Member, 2023–date
- Chemical Processing Division, 2023–date
- Operations Secretary, Chemical Processing Division, 2024

### **Miscellaneous Chairs/Organization**

- Scientific Advisory Board, *The Bioprocessing Summit*, Boston, MA, August 15–18, 2022

### **Reviewer for**

- Automatica
- American Control Conference
- IEEE Conference on Decision and Control
- Journal of Process Control
- IFAC World Congress
- ChemEngineering
- Korean Journal of Chemical Engineering
- International Conference on Control, Automation and Systems (ICCAS)
- Processes
- Biotechnology Progress
- Organic Process Research & Development
- International Journal of Control, Automation and Systems

### **Seoul National University**

- Academic Committee, Chemical and Biological Engineering, 2024–2026