MOO SUN HONG

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EDUCATION

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

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

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

HONORS AND AWARDS

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

Adjunct Professor, Graduate School of Engineering Practice, SNU, Seoul, Korea, 2024–date

Adjunct Professor, Interdisciplinary Program in Bioengineering, SNU, Seoul, Korea, 2024–date

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

Postdoctoral Associate, Department of Chemical Engineering, MIT, Cambridge, MA, 2021–2023

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

INVITED TALKS

[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. *Intensified & Continuous Processing, BioProcess International Europe*, 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*, Boson, MA (virtual), August 28, 2020.

[5] A case study in applying PAT to the continuous biomanufacturing of monoclonal antibodies. *Intensified & Continuous Processing, BioProcess International*, 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. *Viral Safety, BioProcess International Europe*, 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. *Manufacturing & Commercialisation, BioProcess International Asia,* April 20, 2023.

[14] ST PHARM, Ansan, Korea, April 20, 2023.

[15] Optimal design and control of advanced biomanufacturing systems. *Toward Practical Application of CCUS Technology for Achieving Carbon Neutrality, 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 end-to-end batch manufacturing of monoclonal antibodies. *BioTalk EU*, Berlin, Germany, September 20, 2023.

[25] Model-based design and control of biopharmaceutical manufacturing processes. *Control and Estimation Application for Bioprocesses, ICCAS*, Yeosu, Korea, October 19, 2023.

[26] ILJU Academy and Culture Foundation, Seoul, Korea, November 2, 2023.

[27] Department of Chemical and Biomolecular Engineering, Yonsei University, Seoul, Korea, December 7, 2023.

[28] Department of Energy and Chemical Engineering, Incheon University, Incheon, Korea, April 23, 2024.

[29] Using AI in chemical and biological processes – Smart process analytics, *Introduction to Machine Learning Applications for Chemical Processes: Supervised, Unsupervised Learning*, *KIChE Spring Meeting*, Jeju, Korea, April 24, 2024.

[30] Optimal design and control of advanced biomanufacturing systems. *Young Professionals Symposium, KIChE Spring Meeting*, Jeju, Korea, April 26, 2024.

[31] Optimal design and control of advanced biomanufacturing systems, *Emerging Technology International Symposium, KMB Annual Meeting & International Symposium*, Busan, Korea, June 20, 2024.

[32] Optimal design and control of advanced biomanufacturing systems, *KIChE Process Systems Engineering Division Summer Workshop*, Seoul, Korea, July 22, 2024.

[33] The future of refining: emerging technologies and trends, *SNU Carbon Neutrality Cluster Seminar Series*, Seoul, Korea, September 20, 2024.

[34] Optimal design and control of advanced biomanufacturing systems, *Young Scientist Forum, KSBB Fall Meeting and International Symposium*, Jeju, Korea, September 26, 2024.

[35] Samsung Bioepis, Incheon, Korea, September 30, 2024.

[36] Real-time automation and optimal control towards self-driving smart biomanufacturing, *Bioprocess Innovation with New Modalities: Digital Transformation and Synthetic Biology, Samsung Global Technology Conference*, Seoul, Korea, December 5, 2024.

[37] Advanced process data analytics for end-to-end biopharmaceutical manufacturing. *Biochemical Engineering Symposium*, Hongcheon, Korea, February 24, 2025.

[38] AI and digital twin for the next-generation biomanufacturing systems. *Tutorial Workshop, KSBB Spring Meeting and International Symposium*, Daejeon, Korea, April 2, 2025.

[39] AI and digital twin for the next-generation biomanufacturing systems. *The Present and Future of Digital Twin Technology in the Biopharmaceutical Industry, Spring International Convention of The Pharmaceutical Society of Korea,* Daegu, Korea, April 21, 2025.

[40] GS Caltex, Daejeon, Korea, May 9, 2025.

[41] Advanced process data analytics for end-to-end biopharmaceutical manufacturing. *Manufacturing Strategy & Digitalization, BioProcess International Europe*, Hamburg, Germany, May 13, 2025.

[42] Department of Chemical and Biological Engineering, Hanbat National University, Daejeon, Korea, May 21, 2025.

[43] AI and digital twin technologies for next-generation biomanufacturing. *The Society of Medicines Manufacturing Innovation Symposium,* Seoul, Korea, May 30, 2025.

PUBLICATIONS (Google Scholar)

† 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. DOI

[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. DOI

[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. DOI

[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. DOI

[6] **M. S. Hong**, K. Kaur, N. Sawant, S. B. Joshi, D. B. Volkin, and R. D. Braatz*. Crystallization of a nonreplicating rotavirus vaccine candidate. *Biotechnology & Bioengineering*, 118(4):1750-1756, 2021. DOI

[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 for process and product characterization of recombinant adeno-associated virus-based gene therapies. *Molecular Therapy — Methods & Clinical Development*, 20:740-754, 2021. DOI

[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. DOI

- Featured in the collection of Editor's Choice papers from the Particle Technology topic area. Link

[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. DOI

- Featured on the cover. Link

[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. DOI

- Featured in *Genetic Engineering & Biotechnology News*, 40(S6):S13-S15, 2020. DOI

[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. DOI

- Featured on the cover. Link

[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. DOI

[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. DOI

[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. DOI

[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. DOI

[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. DOI

[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. DOI

[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. DOI

[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 time series and batch data for the end-to-end batch manufacturing of monoclonal antibodies. *Computers & Chemical Engineering*, 182:108557, 2024. DOI

[21] S. Byun, B. Ge, H. Song, S.-P. Cho, **M. S. Hong**, J. Im*, and I. Chung*. Simultaneously engineering electronic and phonon band structures for high-performance n-type polycrystalline SnSe. *Joule*, 8(5):1520-1538, 2024. DOI

[22] S. H. Kim*, **M. S. Hong**, and R. D. Braatz*. Investigation of particle flow effects in slug flow crystallization using the multiscale computational fluid dynamics simulation. *Chemical Engineering Science*, 297:120238, 2024. DOI

[23] P. Srinivasan†, C. T. Canova†, S. Sha†, T. N. T. Nguyen†, J. Joseph†, J. Sangerman, A. J. Maloney, G. Katsikis, R. W. Ou, **M. S. Hong**, J. Ng, C. Neufeld, J. M. Wolfrum, P. W. Barone, A. J. Sinskey*, S. L. Springs*, and R. D. Braatz*. Multidose transient transfection of HEK293 cells modulates rAAV2/5 Rep protein expression and influences the enrichment fraction of filled capsids. *Biotechnology & Bioengineering*, 121(12):3694-3714, 2024. DOI

[24] V. Bal, **M. S. Hong**, J. Wolfrum, P. W. Barone, S. L. Springs, A. J. Sinskey, R. M. Kotin, and R. D. Braatz*. An integrated experimental and modeling approach for crystallization of complex biotherapeutics. *Crystal Growth & Design,* 25(11):3687-3696, 2025. DOI

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, November 4, 2021. U.S. Patent Publication No. 2023/0167417 A1, June 1, 2023.

[2] **M. S. Hong**, B. K. Kim, S.-G. Jeong, and Y. Y. Choi. Screening method for resistant microbials based on computer vision analysis. Korea Patent Application No. 10-2024-0003598, January 9, 2024.

[3] I. Chung, H. Lee, S. Byun, and **M. S. Hong**. Sn-Se based thermoelectric material. Korea Patent Registration No. 10-2777902. March 4, 2025.

Proceeding Papers

[1] 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. DOI

[2] 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. DOI

[3] D. Park†, T. N.T. Nguyen†, J. Sangerman, P. Srinivasan, R. W. Ou, G. Katsikis, **M. S. Hong**, P. W. Barone, C. Neufeld, J. M. Wolfrum, S. L. Springs, A. J. Sinskey, and R. D. Braatz. Continuous production of recombinant adeno-associated viral vectors via transient transfection of HEK293 cells in perfusion bioreactor. *Computer Aided Chemical Engineering*, 53:2587-2592, 2024. DOI

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] **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 11–12, 2018.

[4] **M. S. Hong**, N. J. Mozdzierz, M. Jiang, and R. D. Braatz. Improving biopharmaceutical stability and minimizing cold-chain burden using continuous protein crystallization. *Joint FAU-MIT Workshop on the Design of Particulate Products by Continuous Processes*, Cambridge, MA, April 6, 2019.

[5] 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 P-Process-Fri-24.

[6] **M. S. Hong**, N. J. Mozdzierz, M. Jiang, and R. D. Braatz. Improving biopharmaceutical stability and minimizing cold-chain burden using continuous protein crystallization. *NIIMBL Technology Workshop on Process Intensification*, Boston, MA, April 25, 2019.

[7] **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.**

[8] **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. **FP&BE Poster Award.**

[9] **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.

[10] **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. Poster.

[11] 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.

[12] 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.

[13] **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.

[14] 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.

[15] **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.

[16] **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 18–20, 2021.

[17] 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. *BioMAN Spring Workshop: Data Analytics along the Biomanufacturing Life Cycle,* May 18–20, 2021.

[18] **M. S. Hong**. Optimal design and control of advanced biomanufacturing systems. *AIChE Annual Meeting*, Boston, MA, November 7–11, 2021. Abstract 4fl.

[19] **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.

[20] 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.

[21] 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.

[22] **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.

[23] 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.

[24] **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.

[25] 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.

[26] **M. S. Hong**, A. Lu, and R. 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.

[27] D. Bozinovski, E. Cummings Bende, A. Maloney, J. Sangerman, A. Dubs, A. Lu, **M. S. Hong**, N. Persits, A. Artamonova, R. W. Ou, W. Sun, J. Wolfrum, P. Barone, S. Springs, R. Braatz, and A. Sinskey. Biomanufacturing and testbed development for the continuous production of monoclonal antibodies. *ACS Spring*, San Diego, CA, March 20–24, 2022. Abstract #3661909.

[28] K. Ganko, **M. S. Hong**, S. Lee, K. C. Schickel, J. Provenzano, A. Grippe, J. Wagner, H. Achwei, D. McNally, S. L. Springs, P. W. Barone, and R. D. Braatz. Mechanistic modeling to predict titers and infected cells in the two-stage continuous production of a viral vaccine. *Integrated Continuous Biomanufacturing V*, Sitges, Spain, October 9–13, 2022.

[29] 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, N. Mohan, M. Y. Nieves, P. W. Barone, J. M. Wolfrum, R. J. Ram, S. L. Springs, R. D. Braatz, and A. J. Sinskey. Biomanufacturing and testbed development for the continuous production of monoclonal antibodies. *Integrated Continuous Biomanufacturing V*, Sitges, Spain, October 9–13, 2022.

[30] **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 9–13, 2022. **Outstanding Poster Presentation Award.**

[31] 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.

[32] **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.

[33] **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.

[34] 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.

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