

Ravendra Singh, PhD

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AREAS OF EXPERTISE

Process Systems Engineering (PSE) including process modelling and simulation, process control, process optimization, Artificial intelligence/machine learning, QbD, PAT, cyber-physical security, new methodology and software development. Current application domains: continuous manufacturing of pharmaceutical drug product, drug substance (API) and bio-pharmaceutical.

EDUCATION

- 2006 – 2009 **PhD., Chemical and Biochemical Engineering**
Computer-aided Process Engineering Center (CAPEC)
Technical University of Denmark (DTU), Denmark
Grade: 12 out of 12 in 3 PhD level courses
- 2004 – 2005 **Exchange master (M.Tech) student, Chemical Engineering**
Process System Engineering Center (AVT)
RWTH Aachen University, Germany
Grade (master thesis): 10 out of 10
- 2003 - 2005 **M.Tech. (master), Chemical Engineering**
Computer aided process plant design (CAPPD) center
Indian Institute of Technology (IIT), Roorkee, India. **Grade:** 9.41 out of 10
- 1999 - 2003 **B.Tech., Chemical Engineering**
BIET Jhansi, India. **Percentage:** 79.46 %

PROFESSIONAL EXPERIENCE

- 2015 - Present **Faculty, Director of Pharmaceutical Systems Engineering**
Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA
Principal/Co-principal investigator of different projects
- 2011 – 2015 **Post Doctoral scientist**
Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA
Engineering Research Center for Structured Organic Particulate Systems (C-SOPS)
Project lead and key researcher –C-SOPS projects
- 2009 - 2011 **Post Doctoral associate**
Department of Chemical and Biochemical Engineering
Technical University of Denmark (DTU), with collaboration of AstraZeneca.
Project lead – F³ Factory (Flexible, fast and future factory)
- 2005 - 2006 **Assistant professor**
Department of Chemical Engineering, Moradabad Institute of Technology, India.

PUBLICATIONS (SEE ATTACHED LIST)

Scientific articles (>85); Book (1); Book chapters (>12); International conference presentations (>151); Citations>2747, h-index>28, i10-index >55.

HONORS AND AWARDS

1. **EFCE Excellence Award** in Recognition of an Outstanding PhD Thesis on Computer Aided Process Engineering, given by **European Federation of Chemical Engineering (EFCE)**, June 2010. EFCE Excellence award is all Europe level competition and given once in two years.
2. “**Most cited** articles award” given by **Elsevier** publisher for most cited articles published in Computers & Chemical Engineering Journal in years 2010 - 2012.
3. “**Top 25 Hottest Articles award**”, selected based on most downloaded manuscript from Science direct, given by science direct, 2009.
4. **Outstanding reviewer award 2015**, from Computers and Chemical Engineering Journal.
5. **Recognized reviewer award 2015**, from several Journals including European Journal of Pharmaceutics and Biopharmaceutics, Advanced Powder Technology, European Journal of Pharmaceutical Sciences, Chemical Engineering Science, Chemical Engineering Research and Design, Powder Technology.
6. Three NIPTE-FDA **travel awards for students**, October 2016, 2017.
7. **Poster presentation award for student**, AIChE conference, November 2016.
8. Dr. Singh’s student Nicholas won 2nd best presentation award in the AIChE Mid Atlantic 2017.
9. Awarded “**DTU Fellowship**” from Technical University of Denmark, 2006.
10. Awarded “**DAAD Fellowship**” from German academic exchange service, Germany, 2004.
11. Awarded “**Second University Topper in Chemical Engineering**”, IIT, Roorkee, India, 2005.
12. Awarded “**Second University Topper in Chemical Engineering**”, BIET Jhansi, UP, India, 2003.
13. Given several invited presentations, workshops and courses including at **Emerson Exchange** Conference (2019), **Optimal company** (USA, 2015 & 2017), Brewer Science, Inc. (USA, 2015), American Association of Pharmaceutical Scientists (**AAPS**) (USA, 2015), Bristol-Myers Squibb (**BMS**) (USA, 2013), **Sartorius Company** (Germany, 2010), **Novo Nordisk** (Denmark, 2010).
14. Invited plenary speaker, at **ESCAPE 20**, Ischia, Naples, Italy, 6 – 9 June, 2010.

RECEIVED GRANTS

Grant received (Currently active projects are highlighted with green color)

1. **2022 -2025: Food & Drug Administration (FDA) (granted)**
A model-based systems engineering approach to end-to-end pharmaceutical manufacturing of liquid dosage forms.
Role: PI (and project technical lead). Source: FDA. Amount: **\$5 Million**.
2. **2021 -2023: Food & Drug Administration (FDA) (granted)**
Integrated toolbox for digital design, scale-up, control, and optimization of advanced API manufacturing processes.
Role: Co-PI (and project technical lead). Source: FDA. Amount: **\$4.198914 Million**.
3. **2021 -2023: Thermo Fisher Scientific (granted)**
Configuring the Continua Digital Twin to include a continuous wet granulation module.
Role: Co-PI (and project technical lead). Source: Thermo Fisher Scientific. Amount: **\$120000**.
4. **2020 -2022: DARPA-SRI (granted)**
ProSyn-Agile Manufacturing of APIs for Rapid Response to Emerging Biological Threats and Pandemics.
Flow-sheet model-based optimization, scale-up, and process control of a continuous flow reactor system
Role: Co-PI and project manager. Source: DARPA. Amount: **\$800,000**.
5. **2020 – 2022: CESMII (granted)**

- Using Smart Manufacturing to enable energy-efficient manufacturing of pharmaceutical products.
Role: **Co-PI**. Source: CESMII. Amount: **\$1,134,022**.
6. **2022 – 2024: Food & Drug Administration (FDA) (granted)**
Knowledge Management for Continuous Manufacturing
Role: Co-PI. Source: FDA. Amount: \$649835.
 7. **2020 -2021: Research Council Award (granted)**
Systematic framework for cyber-physical security of continuous pharmaceutical and biopharmaceutical manufacturing processes.
Role: **PI**. Source: Rutgers. Amount: **\$3500**.
 8. **2020 -2023: Food & Drug Administration (FDA) (granted)**
Development and Round-robin Verification of Dynamic RTD Models for the On-line Product Quality Analysis.
Role: Co-Investigator. Source: FDA. Amount: **\$2.4 Million**.
 9. **2019 -2020: Glaxo Smith Kline (GSK) (granted)**
Title: Development of Computational Models for Continuous Tablet Manufacturing
Role: **PI** (and project lead). Source: GSK Company. Amount: **\$540,000**.
 10. **2019 -2020: Siemens (granted)**
Title: Enable full implementation of “Integrated Cyber-Physical Security Framework and Novel Control Module” for continuous pharmaceutical manufacturing plant
Role: **PI** (and project lead). Source: Siemens Company. Amount: **\$71,800**.
 11. **2019 - 2020: Haldor Topsoe (granted)**
Title: Robustness of the continuous pharmaceutical manufacturing process model when applied to Haldor Topsoe’s materials
Role: **Co-PI**. Source: Haldor Topsoe. Amount: **\$26,850**.
 12. **2018-2022: Food & Drug Administration (FDA) (granted)**
Industry 4.0 Implementation in Continuous Pharmaceutical Manufacturing
Role: **Co-PI** (and project lead). Source: FDA. Amount: **\$4 Million**.
 13. **2018-2022: Food & Drug Administration (FDA) (granted)**
Advanced Bio-manufacturing
Role: **Co-PI**. Source: FDA. Amount: **\$1.8 Million**
 14. **2018 -2019: Glaxo Smith Cline (GSK) (granted)**
Development of Computational Models for Continuous Tablet Manufacturing
Role: **PI** (and project lead). Source: GSK Company. Amount: **\$539,991**.
 15. **2018 -2019: Siemens (granted)**
Cyber-physical security in the Pharmaceutical Manufacturing Process
Role: **PI** (and project lead). Source: Siemens Company. Amount: **\$75,000**.
 16. **2018 Diversitech Corporation (granted)**
Fluid bed drying trials
Role: **PI**. Source: **Diversitech** Company. Amount: **\$1600**.
 17. **2018 Rutgers Global International Travel Grant (granted)**
Role: **PI**. Amount: **\$750**.
 18. **2018 -2019: CNH (granted)**
Wear prediction and validation with fine particle interaction
Role: **Co-PI**. Source: CNH Company. Amount: **\$118608**.
 19. **2017 -2018: Glaxo Smith Cline (GSK) (granted)**
Development of tablet press feed frame RTD model and BU to CU relation

Role: **Co-PI** (and project lead). Source: GSK Company. Amount: **\$150000**.

20. 2017: Grant to establish international collaboration (granted)

Grants to Support the Initiation of International Collaboration.

Role: **Co-PI**. Source: Hamburg University of Technology. Amount: **€1610**.

21. 2016: Integra Continuous Manufacturing Systems (granted)

Development of sensing and control strategy for direct compaction continuous pharmaceutical tablet manufacturing process. **Role: PI** (and project lead). Source: Acumen Company. Amount: **\$5114**.

22. 2016: Research Council Award (granted)

Development and validation of advanced model predictive feedforward/feedback control strategy for pharmaceutical process. **Role: PI** (and project lead). Source: Rutgers. Amount: **\$3800**.

Contribution in other project as a co-investigator but not PI/Co-PI (most recent projects)

1. 2023: USP (granted)

USP Technical Guide on Process Modeling in Pharmaceutical Continuous Manufacturing.

Role: **Co-investigator** (responsible for modelling work package). Source: USP. Amount: **\$50000**.

2. 2020: Vertex (granted)

Rutgers Support for Vertex: Expanding RTD, Material Properties, and Modeling Capabilities for CM Applications.

Role: **Co-investigator** (responsible for modelling work packages)

. Source: Vertex. Amount: **\$150000**.

3. 2019: Food & Drug Administration (FDA) and NIPTE (granted)

Comprehensive Training Program in Continuous Solid Dose Manufacturing

Role: **Co-Investigator** (responsible for two course modules). Source: FDA/NIPTE. Period: 2019 – 2021. Amount (Rutgers part only): **\$490,000**.

4. 2019: United States Pharmacopeia (USP) (granted)

Introduction to Continuous Manufacturing: Pharmaceutical Industry

Role: **Co-Investigator** (responsible for two course modules: Control, Modelling. [Link for more details](#)). Source: USP. Period: 2019 – 2021.

5. 2019 Johnson & Johnson (granted)

Modular Digital Twin Generator. Role: **Consultant**. Amount: **\$1.5 Million**.

Grant received as a faculty advisor

1. 2023 Louis Stokes Alliances for Minority Participation (LSAMP) (Granted)

Financial support of two undergrad students

Role: **Advisor** (students name: Judah Anyobodeh, Mohammed Elfaranawy. Source: National Science Foundation (NSF). Amount: **Full financial coverage of two students**.

2. 2023 ARESTY (Rutgers) (Granted)

Financial support of 7 undergrad students

Role: **Advisor** (students name: Nabih Umar, Bhakti Ramani, Abdullah Rashid, Nicole Pilch, Adi Patel, Navpreet Singh. Source: ARESTY program. Amount: **Full financial coverage of 7 students**.

3. 2022 Louis Stokes Alliances for Minority Participation (LSAMP) (Granted)

Financial support of one undergrad student

Role: **Advisor** (students name: Kelvin Gujman. Source: National Science Foundation (NSF). Amount: **Full financial coverage of one student.**

4. **2022 ARESTY (Rutgers) (Granted)**
Financial support of four undergrad students
Role: **Advisor** (students name: Jenil Kanabar, Anusri Arora, Karolina Ulicki, and Erick Lopez Lianos. Source: ARESTY program. Amount: **Full financial coverage of four students.**
5. **2020 ARESTY (Rutgers) (Granted)**
Financial support of two undergrad students
Role: **Advisor** (students name: Hira Javed and Naomy Arias-Fernandez). Source: ARESTY program. Amount: **Full financial coverage of two students.**
6. **2018 -2019 Kyowa Kirin Co., Ltd. (Japan) (Granted)**
Residence time distribution modelling and in line monitoring of drug concentration in a tablet press feed frame containing dead zones
Role: **Co-Advisor** (visiting scientist: Dr. Shinji Tanimura). Source: Kyowa Kirin Co., Ltd.. Amount: **\$10,000 + one-year financial support to visiting scientist.**
7. **2018 - 2019 Mitsubishi Tanabe Pharma Corporation (Japan) (Granted)**
Effect of material properties on the residence time distribution in a tableting press feed frame
Role: **Co-Advisor** (visiting scientist: Dr. Ryoichi Furukawa). Source: Mitsubishi Tanabe Pharma Corporation. Amount: **\$49,121.09 + one-year financial support to visiting scientist.**
8. **2018 ARESTY (Rutgers) (Granted)**
Financial support of one undergrad student
Role: **Co-Advisor** (student name: Jack Stringer). Source: ARESTY program. Amount: **Full financial coverage of student.**
9. **2017 NIPTE (USA) (Granted)**
Student travel award to attend NIPTE conference
Role: **Advisor** (student name: Fernando N. Barros). Source: NIPTE. Amount: **Full coverage of conference fees, travel and accommodation.**
10. **2017 NIPTE (USA) (Granted)**
Student travel award to attend NIPTE conference
Role: **Advisor** (student name: Aparajith Bhaskar). Source: NIPTE. Amount: **Full coverage of conference fees, travel and accommodation.**
11. **2017 ARESTY (Rutgers) (Granted)**
Financial support of one undergrad student
Role: **Co-Advisor** (student name: Nicholas Townsend Haas). Source: ARESTY program. Amount: **Full financial coverage of student.**

COMPLETED OTHER RESEARCH PROJECTS

Contributed significantly in project proposal writing of following grants and served as a project lead and key researcher:

1. **2015 FDA (granted)**

Project title: Implementation of continuous solid dose manufacturing systems, equipped with control systems that are capable of handling raw material variability and assuring product quality in real time. Role: Researcher. Source: FDA. Amount: \$4,000,000.

2. **2015 GSK** (granted)

Project title: Integration of PAT and process models into a continuous manufacturing line. Role: Project manager and key researcher. Source: GSK. Amount: \$200,000.

3. **2014 Johnson & Johnson** (granted)

Project title: J&J expansion of continuous pharmaceutical manufacturing. Role: Researcher, Source: Johnson & Johnson Company, Amount: \$3,500,000

4. **2014 Johnson & Johnson** (granted)

Project title: Modeling, PAT and control development for Consigma/Tramacet. Role: Project manager and key researcher. Source: Johnson & Johnson Company. Amount: \$1,000,000 (\$800,000 EUR, 1 EUR: 1.25 USD at contract signing)

5. **2014 Food & Drug Administration (FDA)** (granted)

Project title: Flowsheet modeling and analysis tools for solid base pharmaceutical products manufacturing. Role: Project manager and key researcher. Source: FDA. Amount: \$500,000.

6. **2014 Process Systems Enterprise** (granted)

Project title: Flowsheet modeling and database development of tablet manufacturing processes. Role: Project manager. Source: PSE Company. Amount: \$70,000.

7. **2014 Johnson & Johnson** (granted)

Project title: Flowsheet modeling of Inspire tablet manufacturing line. Role: Project manager. Source: Johnson & Johnson Company. Amount: \$131,273.

8. **2014 Johnson & Johnson** (granted)

Project title: Rutgers support for Continuation of Continuous Process Development Phase II. Role: Researcher. Source: Johnson & Johnson Company. Amount: \$488,683.

POST DOCTORAL RESEARCH

- **2011-2015: Rutgers University, USA. Project:** NSF-ERC. Focus: continuous tablet manufacturing. **Main accomplishments:** Designed and implemented advanced MPC and PID based control system for a continuous flexible pharmaceutical tablet manufacturing pilot-plant. Implemented dynamic real time optimization strategy into continuous tablet manufacturing process. Work with a student team to develop the process model of tablet manufacturing process.
- **2009 – 2011: DTU. Project:** F³ Factory (focus: continuous API manufacturing). **Main accomplishments:** Developed an adaptive template based flexible and fast new continuous manufacturing technique for APIs production for drug discovery phase. Developed model and a new graphical tool (operating window) to adapt the template.

ACADEMIC PROJECTS

- **PhD project (DTU):** Model-based computer-aided framework for design of process monitoring and analysis systems. **Main accomplishments:** Developed a systematic framework including the methods and tools for design, analysis, implementation and validation of process monitoring, analysis and control systems. Designed a process monitoring and control system for tablet manufacturing process and fermentation process. Developed a model library (process models: pharmaceutical tablet manufacturing, fermentation, crystallization, cheese manufacturing) and software tool ICAS-PAT. **Advisors:** Prof. Rafiqul Gani (Denmark), Prof. Krist V. Gernaey.

- **Master project (RWTH):** Temperature trajectory optimization and control for a thermostated batch crystallization apparatus. Developed validated crystallization process model. **Advisor:** Prof. Wolfgang Marquardt (Germany).

EXPERIENCE ON MATHEMATICAL MODELING AND SIMULATION (FEW EXAMPLES)

- Developing a digital twin of continuous injectable manufacturing process.
- Developed a digital twin of continuous API manufacturing process.
- Developed an “adaptive RTD tool box” for continuous pharmaceutical manufacturing process. Developed residence time distribution (RTD) model of continuous pharmaceutical manufacturing pilot-plant.
- Developed integrated flowsheet model of continuous tablet manufacturing process using gPROMS simulation tool. Applied the model for control system design. Unit operations modeled are feeder, blender, wet granulation, dryer, roller compaction, milling, tablet press.
- Modeled Crystallization process.
- Developed fermentation process model and control strategy.
- Developed artificial intelligence (AI)/ machine learning (ML) model for continuous pharmaceutical manufacturing process.
- Integrated the pharmaceutical process model with the actual control platform (DeltaV, PharmaMV) to facilitate at site parameter estimation and model refinement and thereby to adapt the model for new operational scenario.
- Integrated the pharmaceutical process model with MATLAB tool to make it OPC compliance.

LABORATORY/PILOT PLANT SKILLS (FEW EXAMPLES)

Practical experience with several experiments including: continuous tablet manufacturing plant operation, continuous injectable manufacturing, monitoring and control, crystallization, and distillation pilot plant. Highly experienced with the application of DeltaV, Process Pulse II, CAMO Unscrambler X, SynTQ, PCS7, SiPAT, OSI-PI, NIR, and Brookfield shear cell. Hands-on experience on control hardware/software integration, PID and MPC control loops implementation, online PID parameters tuning, online MPC model generation, NIR calibration, and in-line process monitoring (PAT).

IT SKILLS/ SOFTWARE PROFICIENCY/SOFTWARE DEVELOPMENT (FEW EXAMPLES)

Highly experienced with various modeling, simulation, optimization, control, monitoring, and other softwares, including: gPROMS, Matlab, Comsol (CFD), GAMS, ICAS-MoT, Labview, Latex, Microsoft Office tools. Proficient with programming languages: Visual basic, FORTRAN, C++, Python.

Developed software: ICAS-PAT, CPS tool, RTD tool box.

TEACHING AND DEMONSTRATION EXPERIENCE

- Active instructor at Rutgers for research-based courses since 2015.
- Developed **online course** on “process modelling and control” for US Food and Drug Administration (FDA).
- Developed training courses for USP.
- Tutored **under graduate level course**, “Environmental studies”. Fully responsible for the course. All the students passed the exams with good marks through an external examination system.
- Teaching assistant of two **graduate level courses** “1. Catalytic and Advanced Reaction Engineering” and “2. Introduction to process control”. Actively involved in course planning, preparing lectures and tutorials. Fully responsible for the tutorial classes and assignments/exercises.
- Given four **invited lectures** at Sartorius Company (Germany), Novo Nordisk Company (Denmark), Optimal Company (USA) and MATLS (Denmark).

- Given invited **crash course** on “pharmaceutical process control & PAT” at Brewer Science, Inc. Rolla, MO, USA, 2015.
- Conducted several **workshops** related to modelling, PAT, control and software development at BMS Company, C-SOPS Industrial Advisory Board Meeting, CAPEC annual meeting. See publication list for details.

PERSONNEL SUPERVISED

Visiting Scientists (6):

- 2018-2019: Dr. Shinji Tanimura (**Kyowa Hakko Kirin Co., Ltd.** Japan)
Title: Residence time distribution modelling and in line monitoring of drug concentration in a tablet press feed frame containing dead zones
- 2018-2019: Dr. Furukawa Ryouichi (**Mitsubishi Tanabe Pharma**, Japan)
Title: Effect of material properties on the residence time distribution in a tableting press feed frame
- 2015-2016: Dr. Jin Maeda (**Daiichi Sankyo**, Kanagawa, Japan).
Title: PAT and feedforward control of tablet press
- 2016: Mushahid Azher (**Bosch**, Germany)
Title: Control of continuous pharmaceutical tablet manufacturing process
- 2016: Su Qinglin (**Purdue University**, USA)
Title: Risk based control system design and performance matrix
- 2016: Rehrl Jacob (**Graz University** of Technology, Austria)
Title: Implementation of pharmaceutical process control

Post-Doctoral Scientist (3):

- 2023 – Present: Athanasios Kritikos: Static mixer and chromatographic separation process modelling
- 2021 –2022: Ardeshir Tabrizi, Rutgers University. Title: API manufacturing.
- 2016 - 2021: Andrés David Román Ospino, Rutgers University. Title: PAT applications.

PhD Students (6): Advisor/Co-advisor

- 2022 – Present: Priya Das
Title: Experimental characterization and advanced modelling of homogenizer used in continuous injectable manufacturing process
- 2022 – Present: Bennie Anderson
Title: CFD modelling of continuous pre-heater and reactor
- 2020 – 2023: Athanasios Kritikos
Title: Mechanistic modeling and validation of multi-scale flow systems for process intensification.
- 2014 – 2015: Andrés David Román Ospino, University of Puerto Rico, Mayagüez, Visiting intern
Title: NIR based real time in-line monitoring of powder bulk density.
- 2011-2014: Maitraye Sen, Rutgers University
Title- multi-scale modeling of continuous mixing processes.
- 2009 – 2011: Noor Asma Fazli Bin Abdul Samad, Technical University of Denmark.
Title: Control of Process Operations and Monitoring of Product Qualities through Generic Model-based in Crystallization Processes.

Master Students: Rutgers University (31):

- 2023 – Present (1): Prakash Sathyamurthy
- 2020 - 2023 (3): Brandon Simone, Rima Rahman, Siddhi Patel.
- 2019 - 2021 (4): Alexander Riveron, Dashank Gohil (Thesis), Colten Schreiner, Kazeem Oladele,
- 2018 - 2020 (6): Yash Melkeri (Thesis), Bi Yming, Jiabin Zhou (ECE), George Hana, Aril Botadra (ISE). Yunseok Choi,

- 2017-2019 (3): Rahul Ramakrishnan (Research credit), Atul Riwari (Research credit), Zachhary Levine (ECE).
- 2016-2018 (4): Mathew Billups (Thesis), Aparajith Bhaskar (Thesis), Fernando Nunes de Barros (Thesis), Rajan Bhawnani (Research credit).
- 2015-2017 (4): Glinka Cathy (Thesis) (Reliance Vitamin, Edison), Nandita Palkar (Research credit) (Gill's Process Control Inc.). Nikhita Shetty (Research credit) (Aurolife Pharma). Nikita Soni (Sun Pharma).
- 2014-2016 (6): Shishir Vadodaria (Pfizer). Sagar Verma (NNE Pharma). Charles Sam Cherian (GSK, Abbvie). Ashish Shah (Hovione). Saket Kashettiwar (Amneal Pharmaceuticals). Rishi Ramesh (Merck, Sun Pharma).

Undergraduates (2014 - Present): Rutgers University (26):

- 2020 - Present (9): Jodah Anyobodeh, Mohammed Alfaranawy (Biomedical), Eric Cho, Nabih Umar (Biomedical), Bhakti Ramani, Abdullah Rashid, Nicole Pilch, Adi Patel, Navpreet Singh.
- 2020-2023 (7): Jenil, Erick, Kelvin, Soha, Karolina, Anusri, Brenton Bongcaron.
- 2020 – 2022 (1): Brandon Simone.
- 2020 – 2021 (3): Naomy Arias Fernandez, Hira Javed, Dylan Santiago Morales (UPRM).
- 2017 – 2020 (2): Disha Patel, Jacob Gehrig (ECE).
- 2014 – 2018 (4): Jack Stringer, Nicholas Townsend Haas, James Forder, Ana Carolina da Silva (Brazilian exchange student).

High school intern (2015 - 2019) (3): Ashray Chowdhry, Rithvik Kondai, Khamis Isayeva

PROFESSIONAL ACTIVITIES/LEADERSHIP/MANAGEMENT: Guest Editor of Processes Journal for a special issue, Editorial board member of International Journal of Chemical and Industrial Polymers, Progress in Petrochemical Science (PPS) Journal and SF Journal of Material and Chemical Engineering. Served as a lead guest editor of Journal of Chemistry (Hindawi Publishing Corporation). Completed more than 100 reviews of Journal manuscripts. IFPAC organizing committee member. BioNJ advisory manufacturing committee member. Active chair/co-chair of AIChE and IFPAC conferences. Member of doctoral and master thesis defense committee at Rutgers. Member of NIPTE, AIChE, AAPS, ISPE professional associations.

PERSONAL ATTRIBUTES: Industrious and Enterprising person with good interpersonal communication skills. Highly dynamic and flexible team-player, with distinct leadership abilities. Proactive, Fast learner, self-driven, highly motivated and reliable. High analytical skills, personal integrity and work standards. Innovative and creative. Strong networking and collaboration skills.

USA Work permit: Green card

NEWSPAPERS COVERAGE: The Times of India (12th June, 2010); Northern India Patrika (12th June 2010); Hindustan Times (12th June 2010); Danik Jagran (11th June 2010); Amar Ujala (10th June 2010); Amrit Prabhat (12th June 2010).

Ravendra Singh, PhD

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<https://ravendrasingh.wixsite.com/ppse>

1. International scientific articles

85. Kritikos, T., **Singh, R***, Tsilomelekis, G., Muzzio, F. (2024). A novel CFD model of SMX Static Mixer used in advanced continuous manufacturing of active pharmaceutical ingredients (API). *Journal of Pharmaceutical Innovation*. <https://doi.org/10.1007/s12247-024--0813-1>.
84. Singh, R. (2024). Digitalization of a novel advanced modular continuous pharmaceutical drug substance manufacturing process. *Pharma Focus Europe*. Issue 4. Accepted.
83. Konkol, J., **Singh, R.**, Muzzio, F., Tsilomelekis, G. (2024). On the synthesis of diphenhydramine: steady state kinetics, solvation effects, and in-situ Raman and benchtop NMR as PAT. *International Journal of Pharmaceutics*. Under review.
82. Chen, Y., Sampat, C., Huang, Y., Ganesh, S., **Singh, R.**, Ramachandran, R., Reklaitis, G. V., Ierapetritou, M. (2024). An integrated data management and informatics framework for continuous drug product manufacturing processes: A case study on two pilot plants. *International Journal of Pharmaceutics*. 642, 123086, <https://doi.org/10.1016/j.ijpharm.2023.123086>.
80. Singh, R. (2023). Advanced pharmaceutical continuous manufacturing of liquid dosage forms. *Pharma Focus Europe*. Issue 3, 55-59. <https://www.pharmafocuseurope.com/manufacturing/advanced-pharmaceutical-continuous-manufacturing>
79. **Singh, R.** (2023). Pharma 4.0: Advanced continuous pharmaceutical tablet manufacturing. *Pharma Focus Europe*. Issue 2. <https://issuu.com/verticaltalk/docs/pfe-issue-02/s/27554699>
78. **Singh, R.** (2023). Advanced continuous manufacturing of drug. *Pharmaceutical Technology*. Trends in Manufacturing eBook, 20-26, May 2023. <https://www.e-digitaleditions.com/i/1499609-pharmaceutical-technology-may-2023/19?>
77. **Singh, R.** (2023). Advanced model predictive control system of continuous biopharmaceutical manufacturing process. *Pharma Focus America*, 64-71, Issue 1, 2023.
76. Chen, Y., Kotamarthy, L., Dan, A., Sampat, C., Bhalode, P., **Singh, R.**, Glasser, B. J., Ramachandran, R. Ierapetritou, M., (2023). Optimization of key energy and performance metrics for drug product manufacturing. *International Journal of Pharmaceutics*. PMID: 36521636. DOI: <https://doi.org/10.1016/j.ijpharm.2022.122487>.
75. Sampat, C., Kotamarthy, L., Bhalode, P., Chen, Y., Dana, A., Parvani, S., Dholakia, Z., **Singh, R.**, Glasser, B. J., Ierapetritou, M., Ramachandran, R. (2022). Enabling Energy-Efficient Manufacturing of Pharmaceutical Solid Oral Dosage Forms via Integrated Techno-Economic Analysis and Advanced Process Modeling. *Journal of Advanced Manufacturing and Processing – AICHE*. <https://doi.org/10.1002/amp2.10136>.
74. Bhalode, P., Tian H., Gupta, S., Razavi, S., Roman-Ospino, A., Talebian, S., **Singh, R.**, Scicolone, J., Muzzio, F.J., Ierapetritou, M. (2021). Using residence time distribution in pharmaceutical solid dose manufacturing – A critical review. *International Journal of Pharmaceutics*, 610, 121248. <https://doi.org/10.1016/j.ijpharm.2021.121248>.
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2. Book

Singh, R., Yuan, Z. (2018). *Process Systems Engineering for Pharmaceutical Manufacturing*. Volume 41, 1st Edition. Publisher: Elsevier. ISBN: 978-0-444-63963-9.

3. Book Chapters

1. **Singh, R.**, Figueroa, CV, Sahay, A., Karry, KM, Fernando Muzzio, F., Ierapetritou, M., Ramachandran, R. (2014). Chapter 7: **Advanced Control of continuous pharmaceutical tablet manufacturing processes**. Book title: *Process Simulation and Data Modeling in Solid Oral Drug Development and Manufacture*. Publisher: Humana Press, ISBN: 978-1-4939-2995-5, 191 – 223.
2. **A Book chapter in “Product and Process Modelling: A case study approach”:**
 - **Singh, R. (2011). Fermentation process modeling.** Chapter 12.2 of book “Product and Process Modelling: A case study approach” edited by I Cameron & R. Gani. Publisher: Elsevier, pp 380-396.
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3. Ierapetritou, M., Escotet-Espinoza, M. S., **Singh, R.** (2017). **Process Simulation and control for continuous pharmaceutical manufacturing of solid drug products**. Chapter 2 of book “Continuous manufacturing of pharmaceuticals” edited by Peter Kleinebudde, Johannes Khinast and Jukka Rantanen. Publisher: Wiley-VCH, pp 33-106.
4. Oka, S, Escotet-Espinoza, M. S., **Singh, R.**, Scicolone, J., Hausner, D., Ierapetritou, M., Muzzio, F. (2017). **Design of an integrated continuous manufacturing system**. Chapter 12 of book “Continuous manufacturing of pharmaceuticals” edited by Peter Kleinebudde, Johannes Khinast and Jukka Rantanen. Publisher: Wiley-VCH, pp 405-446.
5. Sen, M., **Singh, R.**, Ramachandran, R. (2018). Chapter 11: Process dynamics, and control of API manufacturing and purification processes. Book title: *Process Systems Engineering for Pharmaceutical Manufacturing*. Publisher: Elsevier, ISBN: 978-0-444-63963-9. *Computer Aided Chemical Engineering*, Volume 41, pp 261-292.
6. Ospino, D., Cárdenas, V., Ortega-Zuñiga, C., **Singh, R.** (2018). Chapter 12: PAT for pharmaceutical manufacturing process involving solid dosages forms. Book title: *Process Systems Engineering for*

- Pharmaceutical Manufacturing. Publisher: Elsevier, ISBN: 978-0-444-63963-9. Computer Aided Chemical Engineering, Volume 41, pp 293-315.
7. **Singh, R. (2018)**. Chapter 13: Model-based control system design and evaluation for continuous tablet manufacturing processes (via direct compaction, via roller compaction, via wet granulation). Book title: Process Systems Engineering for Pharmaceutical Manufacturing. Elsevier, ISBN: 978-0-444-63963-9. Computer Aided Chemical Engineering, Volume 41, pp 317-351.
 8. **Singh, R. (2018)**. Chapter 17: Automation of continuous pharmaceutical manufacturing process. Book title: Process Systems Engineering for Pharmaceutical Manufacturing. Publisher: Elsevier, ISBN: 978-0-444-63963-9. Computer Aided Chemical Engineering, Volume 41, pp 431-446.
 9. **Singh, R. (2018)**. Chapter 18: Implementation of control system into continuous pharmaceutical manufacturing pilot-plant (powder to tablet). Book title: Process Systems Engineering for Pharmaceutical Manufacturing. Publisher: Elsevier, ISBN: 978-0-444-63963-9. Computer Aided Chemical Engineering, Volume 41, pp 447-469.
 10. Oka, S, Escotet-Espinoza, M. S., **Singh, R.**, Scicolone, J., Hausner, D., Ierapetritou, M., Muzzio, F. (2018). Diseño de Sistemas Integrados de Manufacturación Continua. Publisher: Eudeba.
 11. **Singh, R.**, Muzzio, F. (2022). Chapter 14: Integrated process control. Book title: How to Design and Implement Powder-to-Tablet Continuous Manufacturing Systems. Editor: Fernando J. Muzzio. Publisher: Elsevier. ISBN: 9780128134795. PP 251-269. <https://doi.org/10.1016/B978-0-12-813479-5.00011-2>
 12. Razavi, S. M., Yohannes, B., **Singh, R.**, Gonzalez, M., Lee, H. P., Cuitiño, A. M. (2022). Continuous tableting. Book title: How to Design and Implement Powder-to-Tablet Continuous Manufacturing Systems. Editor: Fernando J. Muzzio. Publisher: Elsevier. ISBN: 9780128134795. PP 159-177. <https://doi.org/10.1016/B978-0-12-813479-5.00009-4>

4. International conferences

A. Plenary lectures/invited keynote lectures in international conferences

8. **Singh, R. (2021)**. Industry 4.0: Continuous Pharmaceutical Manufacturing Process. Keynote presentation at AIChE, Hybrid: Boston (Nov. 7-11) and Virtual (Nov. 15-19).
7. **Singh, R. (2015)**. Flowsheet Modeling and Analysis of Continuous Tablet Manufacturing Processes. American Association of Pharmaceutical Scientists (AAPS), Bristol-Myers Squibb, Plainsboro, NJ, USA, 1st June.
6. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R (2014). A novel continuous pharmaceutical manufacturing process integrated with inline PAT tools and advanced feedback control system. **ISPE annual meeting**, Las Vegas, Nevada USA, 12-15 October.
5. Muzzio, F., Ierapetritou, M., Ramachandran, R., Roger, A., and **Singh, R. (2014)**. Achieving Excellence in Continuous Manufacturing. **IFPAC-Cortona14, Italy**, 28 September –1 October.
4. Gani, R., Gernaey, K. V., **Singh, R. (2008)**. A model-based framework for design and analysis of PAT systems. Plenary lecture at EUROFACT, Frankfurt, Germany, 22 – 25 April.
3. Gernaey, K. V., **Singh, R.**, Gani, R. (2009). A systematic computer aided framework for design and analysis of PAT systems. Plenary lecture at 8th World Congress of Chemical Engineering, Montreal, Quebec, **Canada**, 23 – 27 August.
2. **Singh, R.**, Gernaey, K. V., Woodley, J. M., Gani, R. (2010). Mechanistic modeling for systematic design and analysis of PAT systems. Invited presentation at **IFPAC 2010**, Baltimore, MD, USA, 31 January- 4 February.
1. **Singh, R. (2010)**. Model-based computer-aided framework for design of process monitoring and analysis systems (PAT systems). Invited presentation, on the ceremony of EFCE Excellence Award for the Outstanding PhD Thesis in CAPE area, from European Federation of Chemical Engineering, **ESCAPE 20**, Ischia, Naples, **Italy**, 6 – 9 June.

B. International conference presentations

Year 2024

140. **Singh, R. (2024).** Continuous pharmaceutical manufacturing of liquid dosage forms: an advanced modular pilot-plant and digital twin. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 3-6 March.
139. **Singh, R. (2024).** Continuous manufacturing of drug substance: a novel digital twin and its applications for dynamic optimization, and control. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 3-6 March.
138. **Singh, R. (2024).** Industry 4.0: Digital transformation of advanced continuous pharmaceutical manufacturing. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 3-6 March.

Year 2023

137. Khakbiz, M., R., Ortega-Zuniga, C., Scicolone, J., Razavi, S. M., **Singh, R.**, Callegari, G., Muzzio, F. (2023). Machine learning approach for prediction of NIR spectra and residence time distributions curves in pharmaceutical continuous manufacturing. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 4-7 June.
136. **Singh, R.**, Muzzio, F. (2023). A novel modular plant and digital twin model of continuous pharmaceutical manufacturing of liquid dosage forms. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
135. **Singh, R. (2023).** A novel digital twin of continuous API manufacturing process and its applications for scenario analysis, digital optimization, and control. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
134. **Singh, R.**, Muzzio, F. (2023). An novel digital RTD toolbox for adaptive modelling, quality control, and material traceability of continuous pharmaceutical manufacturing process. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
133. **Singh, R. (2023).** Industry 4.0: Digital transformation of advanced continuous pharmaceutical manufacturing. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
132. Anderson, B., Muzzio, F., **Singh, R. (2023).** Investigating the effects of coil diameters on the heating efficiency of a twisted-helix preheater for continuous API Synthesis through CFD Modeling. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
131. Anderson, B., Muzzio, F., **Singh, R. (2023).** Screening of parameters influencing performance of tangential/crossflow filtration systems in continuous API manufacturing processes with a mechanistic CFD model. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
130. Kritikos, A., Tsilomelekis, G., Muzzio, F., **Singh, R., (2023).** CFD-Based Evaluation of Mixing Efficiency and Flow Uniformity in an SMX Static Mixer. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
129. Kritikos, A., **Singh, R.**, Muzzio, F., Tsilomelekis, G. (2023). Optimizing Reverse Phase Chromatography Separation in Molnupiravir Synthesis: An Inverse Method Approach. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
128. Konkol, J., **Singh, R.**, Muzzio, F., Tsilomelekis, G. (2023). At-line monitoring of diphenhydramine synthesis via low-field NMR spectroscopy as process analytical technology. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
127. Das, P., Muzzio, F., **Singh, R. (2023).** A digital twin model of homogenizer used in continuous injectables manufacturing. Oral presentation at AIChE, Orlando, FL, USA, November 5-10, 2023.
126. **Singh, R.**, Muzzio, F. (2023). RTD toolbox for adaptive modelling, quality control, and material traceability. Oral presentation at AAPS conference, Orlando, USA, 22-25 October.
125. **Singh, R.. (2023).** A novel digital twin of end-to-end continuous manufacturing of injectable. Oral presentation at AAPS conference, Orlando, USA, 22-25 October.
124. **Singh, R.. (2023).** Pharma 4.0: Digital manufacturing of advanced continuous pharmaceutical tablet manufacturing. Oral presentation at AAPS conference, Orlando, USA, 22-25 October.

123. **Singh, R. (2023).** Industry 4.0: Digital technology for advanced continuous pharmaceutical manufacturing. Oral presentation at International System Dynamics Conference, Chicago, USA, 23-27 July.
122. **Singh, R., Muzzio, F. (2023).** A novel flowsheet model of continuous API manufacturing process and its applications for dynamic optimization and control. Oral presentation at International System Dynamics Conference, Chicago, USA, 23-27 July.
121. **Singh, R., Muzzio, F. (2023).** A novel RTD toolbox for adaptive modelling, quality control, and material traceability of continuous pharmaceutical manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 4-7 June.
120. **Singh, R., Muzzio, F. (2023).** A novel digital twin model of continuous pharmaceutical manufacturing of liquid dosage forms. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 4-7 June.
119. **Singh, R. (2023).** Industry 4.0: Digital technology for advanced continuous pharmaceutical manufacturing. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 4-7 June.
138. Romanach, R., Ortega-Zuniga, **Singh, R.**, et. Al. (2023). Variographic analysis of residence time distribution studies. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 4-7 June.
117. Konkol, J., **Singh, R.**, Muzzio, F., Tsilomelekis, G. (2023). At-line monitoring of diphenhydramine synthesis via low-field nmr spectroscopy as process analytical technology. Québec City, Canada. June 11-14, 2023.
116. Kritikos, A., **Singh, R.**, Muzzio, F., Tsilomelekis, G. (2023). Mixing and flow characterization in an smx static mixer. International symposia on chemical reaction engineering. Québec City, Canada. June 11-14, 2023.
115. Ortega-Zuniga, C., Scicolone, J., **Singh, R.**, and Muzzio, F. J. (2023). A real-time quality control toolbox for predicting the dissolution profile of tablets from a continuous pharmaceutical manufacturing pilot-plant using a non-destructive NIR spectroscopy method. Poster presentation at International Consortium for Advanced Medicines Manufacturing (ICAMM), Boston, USA, 27-28 April, 2023.

Year 2022

114. **Singh, R., Muzzio, F. (2022).** A novel adaptive residence time distribution (RTD) modelling toolbox. Oral presentation at AIChE, Phoenix, AZ, USA, November 13-18, 2022.
113. **Singh, R., Muzzio, F. (2022).** Integrated flowsheet model of continuous API manufacturing process and its applications for dynamic optimization and control. Oral presentation at AIChE, Phoenix, AZ, USA, November 13-18, 2022.
112. **Singh, R. (2022).** Industry 4.0: Advanced continuous pharmaceutical tablet manufacturing process. Oral presentation at AIChE, Phoenix, AZ, USA, November 13-18, 2022.
111. **Singh, R., Muzzio, F. (2022).** A novel RTD toolbox for continuous pharmaceutical manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 12-15 June.
110. **Singh, R., Muzzio, F. (2022).** A digital twin of flexible modular continuous API manufacturing process and its applications for dynamic optimization and control. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 12-15 June.
109. **Singh, R. (2022).** Industry 4.0: Advanced continuous pharmaceutical tablet manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 12-15 June.

Year 2021

108. **Singh, R., Muzzio, F. (2021).** RTD Based Digital Twin of Continuous Pharmaceutical Manufacturing Process. Oral presentation at AIChE, Boston, USA, November 7-11, 2021.
107. **Singh, R., Lim, J., Collins, N., Muzzio, F. (2021).** A Digital Twin of Flexible Modular Continuous API Manufacturing Process. Oral presentation at AIChE, Oral presentation at AIChE, Boston, USA, November 7-11, 2021.
106. **Singh, R. (2021).** Applications of industry 4.0 concepts in continuous pharmaceutical tablet manufacturing process. Invited webinar at BioPharma Asia, Virtual presentation, 3rd November 2021.

105. Singh, R., Lim, J., Collins, N., Muzzio, F. (2021). A digital twin for API manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.
104. Lim, J., Collins, N., Singh, R., Muzzio, F. (2021). A novel continuous API manufacturing process for emergency pandemic response. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.
103. Singh, R., Riveron, A. (2021). Applications of industry 4.0 concepts in continuous pharmaceutical tablet manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.
102. Singh, R. (2021). Industry 4.0: Continuous pharmaceutical manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.
101. Roman-Ospino, A., Singh, R., et al. (2021). Sampling Optimization for Blend Monitoring of a Low Dose Formulation in a Tablet Press Feed Frame Using Spatially Resolved Near-Infrared Spectroscopy. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.
100. Gupta, S., Roman-Ospino, A., Singh, R., Hausner, D., Muzzio, F. (2021). Development of an In-line Near Infrared Spectroscopy-based Methodology to Determine the Blend Composition Distributions in Partially Agglomerated Low Dose Blends. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 28 February -5 March.

Year 2020

99. Singh, R., Ramachandran, R., Muzzio, F. J. (2020). Pharma 4.0: Advanced control and cyber-physical security of continuous pharmaceutical manufacturing pilot-plant. Oral presentation at AIChE, San Francisco, CA, USA, November 15-10, 2020.
98. Singh, R., Muzzio, F. J. (2020). Dynamic optimization of feeder refill strategy used in continuous pharmaceutical manufacturing process. Oral presentation at AIChE, San Francisco, CA, USA, November 15-10, 2020.
97. Singh, R., Muzzio, F. J. (2020). Pharma 4.0: Advanced control and cyber-physical security of CPM pilot-plant. Oral presentation at Emerson Global Users Exchange Americas conference. Washington, DC, USA, Sept 27 –October 1, 2020.
96. Singh, R., Muzzio, F. J. (2020). Modelling and optimization of continuous pharmaceutical manufacturing process. Oral presentation at Emerson Global Users Exchange Americas conference. Washington, DC, USA, Sept 27 –October 1, 2020.
95. Singh, R. (2020). Cyber security of pharmaceutical manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 23 - 26 February.

Year 2019

94. Singh, R., Ramachandran, R., Ierapetritou, M., Muzzio, F. J. (2019). Industry 4.0: Advanced Bi-layer Control System for Continuous Pharmaceutical Manufacturing Pilot-plant. Oral presentation at AIChE, Orlando, FL, USA, November 10-15, 2019.
93. Singh, R. (2019). Cyber-Physical Security of Advanced Automated Continuous Pharmaceutical Manufacturing Pilot-Plant. Oral presentation at AIChE, Orlando, FL, USA, November 10-15, 2019.
92. Singh, R. (2019). Process Systems Engineering (PSE). Poster presentation at AIChE, Orlando, FL, USA, November 10-15, 2019.
91. Singh, R. (2019). Advanced Process Control System for Continuous Pharmaceutical Manufacturing. Oral presentation at Emerson Global Users Exchange Americas conference. Nashville, TN, USA, Sept 23 -27, 2019.

90. **Singh, R.,** Muzzio, F. J. (2019). Implementation of Advanced Process Control System into Continuous Pharmaceutical Manufacturing Pilot-Plant. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 3 - 6 March.

Year 2018

89. **Singh, R.,** Muzzio, F. J. (2018). RTD Based Control System for Continuous Pharmaceutical Manufacturing Process. Oral presentation at AIChE, Pittsburgh, USA, 28 October - 2 November, 2018.
88. **Singh, R. (2018).** Implementation of Advanced Process Control System into Continuous Pharmaceutical Manufacturing Pilot-Plant. Oral presentation at AIChE, Pittsburgh, USA, 28 October - 2 November, 2018.
87. **Singh, R. (2018).** Process System Engineering (PSE): Continuous Pharmaceutical and Bio-pharmaceutical Manufacturing. Poster presentation at AIChE, Pittsburgh, USA, 28 October - 2 November, 2018.
86. **Singh, R.,** Muzzio, F. J. (2018). Advanced model predictive control of continuous pharmaceutical manufacturing process. Oral presentation at IFPAC, Maryland (Washington D.C.), USA, 11 - 14 February.

Year 2017

85. **Singh, R.,** Muzzio, F. J, Ierapetritou, M., Ramachandran, R. (2017). Advanced model predictive control of powder level in continuous pharmaceutical manufacturing pilot-plant. Oral presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
84. **Singh, R.,** Muzzio, F. J, Ierapetritou, M., Ramachandran, R. (2017). Integrated control and data management system for continuous pharmaceutical manufacturing process. Oral presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
83. **Singh, R. (2017).** Pharmaceutical system engineering. Poster presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
82. Shah, A., Ramachandran, R., **Singh, R. (2017).** Moving horizon based real time optimization and hybrid control of continuous pharmaceutical manufacturing process. Oral presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
81. Maeda, J., Escotet-Espinoza, MS, **Singh, R.,** Ierapetritou, M. (2017). Real-time monitoring and control of API concentration in a tablet press for continuous manufacturing of tablets. Oral presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
80. Román-Ospino, A. D., Oka, S., Mogthadernejad, S., Escotet-Espinoza, M. S., **Singh, R.,** Ramachandran, R., Ierapetritou, M., Muzzio, F. J. (2017). Residence time distribution and segregation studies through real time measurements by near infrared spectroscopy. Oral presentation at AIChE annual meeting, Minneapolis, MN, USA, 29 October – 3 November.
79. Barros, F. N., Bhaskar, A., **Singh, R. (2017).** A validated model for design and evaluation of advanced control systems for continuous tablet manufacturing processes. Poster presentation at NIPTE Conference, USP, Maryland, USA, 14-15 September.
78. Bhaskar, A., Barros, F. N., **Singh, R. (2017).** Development and implementation of an advanced model predictive control system into continuous pharmaceutical tablet compaction process. . Poster presentation at NIPTE Conference, USP, Maryland, USA, 14-15 September.
77. Wang, Z., Escotet-Espinoza, M. S., **Singh, R.,** Ierapetritou, M. G. (2017). Surrogate-Based Optimization for Pharmaceutical Manufacturing Processes. Oral presentation at ESCAPE27, Barcelona, Spain, 1 – 5 October.
76. Haas, N. T., **Singh, R.,** Ierapetritou, M. G. (2017). Advanced Model Predictive Feedforward/Feedback Control of a Tablet Press. Oral presentation at AIChE Mid Atlantic conference, Rowan University, Glassboro, NJ, USA, 24 – 25 March. Paper award winner (2nd place).

Year 2016

75. **Singh, R. (2016).** Process system engineering for advanced modular continuous pharmaceutical manufacturing platform. Poster presentation at meet the faculty candidate session, AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.

74. **Singh, R.**, Muzzio, F. J, Ramachandran, R. Ierapetritou, M. (2016). Advanced flexible control system implementation into direct compaction continuous pharmaceutical manufacturing pilot-plant. Oral presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.
73. **Singh, R.**, Cao, H., Mushnoori, S., Higgins, B., Kolipara, C., Fermier, A., Hausner, D., Jha, S., Ierapetritou, M., Ramachandran, R. (2016). Data management and integration for continuous pharmaceutical manufacturing. Oral presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.
72. **Singh, R.**, Pereira, G. C., Soni, N., Román-Ospino, A. D., Ierapetritou, M., Ramachandran, R. (2016). Feedforward control of continuous pharmaceutical manufacturing process. Oral presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.
71. Wang, Z., Escotet-Espinoza, M. S., **Singh, R.**, Muzzio, F. J., Ierapetritou, M. G. (2016). Feasibility Analysis of Flowsheet Models in Continuous Pharmaceutical Manufacturing Processes Considering the Effects of Noise. Poster presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.
70. Wang, Z., Escotet-Espinoza, M. S., **Singh, R.**, Muzzio, F. J., Ierapetritou, M. G. (2016). Surrogate-Based Optimization Methodology for Pharmaceutical Tablet Manufacturing Processes. Oral presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November.
69. Haas, N. T., **Singh, R.**, Ierapetritou, M. G. (2016). Advanced Model Predictive Feedforward/Feedback Control of a Tablet Press. Poster presentation at AIChE annual meeting, San Francisco, CA, USA, 13 – 18 November. Poster award winner (3rd place).
68. Pereira, G., Román, A., Clancy, D., Igne, B., Airiau, C., Ierapetritou, Ramachnadran, R., **Singh, R.** (2016). Combined Feed-forward/Feed-back Control of an Integrated Continuous Granulation Process. Poster presentation at NIPTE Conference, FDA White Oaks Campus, Silver Spring, MD, USA, 3-4 October.
67. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R. (2016). Combined feedforward/feedback control and automation of direct compaction continuous pharmaceutical tablet manufacturing plant. Oral presentation at IFPAC 2016, Arlington, VA (Washington DC), USA, 24 - 27 January.
66. Maeda, J., **Singh, R.**, Ierapetritou, M. (2016). Real-time monitoring and control of API concentration in a tablet press for continuous manufacturing of tablets. Oral presentation at IFPAC 2016, Arlington, VA (Washington DC), USA, 24 - 27 January.
65. Román-Ospino, A. D., **Singh, R.**, Ierapetritou, M., Ramachandran, R., Ortega, C., Méndez, R., Rodolfo J. Romañach, R. J. (2016). Development of Calibration Models for Real Time Prediction of Powder Density by Near Infrared Spectroscopy. Oral presentation at IFPAC 2016, Arlington, VA (Washington DC), USA, 24 - 27 January.
64. Engel, B., **Singh, R.** (2016). Automated Batch Reporting for Continous Manufacturing: data management, batch reporting, analytics and traceability. Oral presentation at IFPAC 2016, Arlington, VA (Washington DC), USA, 24 - 27 January.
63. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R. (2016). Systematic framework for design and implementation of plant-wide multilayer, sensing and control architecture into continuous pharmaceutical manufacturing plant. Poster presentation at ESCAPE 26, Portorož **Slovenia**, 12 June - 15 June.

Year 2015

62. **Singh, R.**, Muzzio, F. J, Ierapetritou, M., Ramachandran, R. (2015). Implementation of Advanced Multilayer Plant-Wide Control Architecture into a Direct Compaction Continuous Pharmaceutical Manufacturing Process. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
61. **Singh, R.**, Escotet-Espinoza, M. S., Vadodaria, S., Zhang, J., Muzzio, F. J, Ramachandran, R., Ierapetritou, M. (2015). Dynamic Modeling and Advanced Control of Tablet Press. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
60. **Singh, R.**, Cherian, C. S., Ramachandran, R. (2015). Sensor modeling. Poster presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
59. **Singh, R.**, (2015). Applied Pharmaceutical Process System Engineering. Poster presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.

58. Shah, A., Ramachandran, R. **Singh, R. (2015)**. Moving Horizon Based Real Time Optimization and Advanced Hybrid Model Predictive Control of Continuous Pharmaceutical Manufacturing Process. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
57. Engel, B., Brodbeck, P., **Singh, R. (2015)**. Applying Batch Data Principles to Continuous Manufacturing for the Purposes of Data Management, Batch Reporting, Analytics and Traceability. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
56. Escotet-Espinoza, M. S., Jayjock, E., **Singh, R.**, Vanarase, A., Muzzio, F. J., Ierapetritou, M. **(2015)**. Characterization and Modeling of Feeders: A Critical Component in Continuous Pharmaceutical Manufacturing. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
55. Zhang, J., Pereira, F., **Singh, R.**, Bermingham, S., Ramachandran, R., Muzzio, F. J., Ierapetritou, M. **(2015)**. A Systematic Approach of Using Material Properties Data for Pharmaceutical Process Simulation. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
54. Wang, Z., Escotet-Espinoza, M. S., **Singh, R.**, Muzzio, F. J., Ierapetritou, M. **(2015)**. Flowsheet Modeling for Oral Solid Drug Product Manufacturing. Oral presentation at AIChE annual meeting, Salt Lake City, UT, USA, 8 – 19 November.
53. **Singh, R.**, Ierapetritou, M., Ramachandran, R. **(2015)**. A Novel Continuous Pharmaceutical Tablet Manufacturing Process Integrated with Inline PAT Tools and an Automated Control System. Oral presentation at IFPAC-QbD Summit, Carolina, Puerto Rico, USA, 9 – 10 June.
52. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R. **(2015)**. Plant-wide control of a continuous tablet manufacturing for Quality-by-Design based pharmaceutical manufacturing. Oral presentation at PSE 2015/ESCAPE 25, Copenhagen, **Denmark**, 31 May - 4 June.
51. **Singh, R.**, Sahay, A., Ierapetritou, M., Ramachandran, R., Muzzio, F. J. **(2015)**. Advanced Feed-forward/feed-back Control of Continuous Pharmaceutical Tablet Manufacturing Process. Oral presentation at IFPAC 2015, Arlington, VA (Washington DC), USA, 25 - 28 January.
50. Sahay, A., **Singh, R.**, Ospino, A. R., Romanach, R. J., Ierapetritou, M., Ramachandran, R., Muzzio, F. J. **(2015)**. An In-Line Method for Continuously Monitoring of Powder Density. Oral presentation at IFPAC 2015, Arlington, VA (Washington DC), **USA**, 25 - 28 January.
49. Ierapetritou, M., Escotet, S., Singh, R., Zhang, J. **(2015)**. Taking Continuous Processing from Good to Great: The Application of Advanced Process Controls and Real-Time Analytics. Oral presentation at 50th AAPS Arden Conference, Baltimore, **USA**, 16 – 18 March.

Year 2014

48. **Singh, R.**, Sahay, A., Muzzio, F., Ierapetritou, M., Ramachandran, R. **(2014)**. Plant-wide advanced hybrid model predictive closed-loop control of continuous pharmaceutical tablet manufacturing pilot-plant for QbD based manufacturing. Oral presentation at AIChE annual meeting (739c), Atlanta, GA, **USA**, 16 - 21 November. <https://aiche.confex.com/aiche/2014/webprogram/Paper369535.html>
47. **Singh, R.**, Sen, M., Muzzio, F., Ierapetritou, M., Ramachandran, R. **(2014)**. Integrated dynamic real time optimization and advanced hybrid MPC-PID control of direct compaction continuous tablet manufacturing process. Oral presentation at AIChE annual meeting (668e), Atlanta, GA, **USA**, 16 - 21 November. <https://aiche.confex.com/aiche/2014/webprogram/Paper369877.html>
46. **Singh, R. (2014)**. Design, Optimization, Monitoring and Control of Continuous Pharmaceutical Manufacturing Plant for QbD and PAT Based Next Generation of Efficient Manufacturing. Poster presentation at AIChE annual meeting (6dp), Atlanta, GA, USA, 16 - 21 November, 2014. <https://aiche.confex.com/aiche/2014/webprogram/Paper373573.html>
45. Roman-Ospino, A., **Singh, R.**, Ramachandran, R., M., Sahay, A., Oka, S., Liu, X., Muzzio, F., Romanach, R. **(2014)**. Real time prediction of powder density in a continuous manufacturing line. International Diffuse Reflectance Conference, Chambersburg, PA, **USA**, 2- 8 August.
44. **Singh, R.**, Sahay, A., Karry, K. M., Sen, M., Romanach, R. J., Muzzio, F. J., Ierapetritou, M., Ramachandran, R. **(2014)**. Advanced hybrid MPC-PID based closed-loop control of continuous pharmaceutical tablet

manufacturing pilot-plant. Oral presentation at IFPAC 2014, Arlington, VA (Washington DC), USA, 21 - 24 January.

43. **Singh, R.**, Roman, A., Krizia M. Karry, K., Sahay, A., Colón, Y.M., Ramachandran, R., Muzzio, F. J., Romañach, R. J. (2014). NIR in Continuous Mixing: Transitioning from Monitoring to Control. Oral presentation at IFPAC 2014 Arlington, VA (Washington DC), USA, 21 - 24 January.

Year 2013

42. **Singh, R.**, Sahay, A., Brodbeck, P., Ierapetritou, M., Ramachandran, R. (2013). Implementation of advanced hybrid MPC-PID control system into a continuous pharmaceutical tablet manufacturing pilot-plant. Oral presentation at AIChE annual meeting (404e), San Francisco, CA, USA, 3 - 8 November. <https://aiche.confex.com/aiche/2013/webprogram/Paper321724.html>
41. **Singh, R.**, Sahay, A., Ierapetritou, M., Ramachandran, R. (2013). Design of an efficient control system for flexible continuous tablet manufacturing process. Poster presentation at AIChE annual meeting (586o), San Francisco, CA, USA, 3 - 8 November. <http://www3.aiche.org/proceedings/Abstract.aspx?PaperID=337206>
40. **Singh, R.**, Boukouvala, F., Jayjock, E., Ierapetritou, M., Muzzio, F., Ramachandran, R. (2013). Optimal operation and advanced control of a flexible multipurpose continuous pharmaceutical tablet manufacturing process. Oral presentation at IFPAC, Baltimore, MD, USA. 22 - 25 Jan.
39. Boukouvala, F., **Singh, R.**, Jayjock, E., Ierapetritou, M., Muzzio, F., Ramachandran, R. (2013). Flowsheet Modeling Methods for Design and Optimization of Continuous Powder Processes. Oral presentation at IFPAC, 2013 Baltimore, MD, USA, 22 - 25 January.
38. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2013). Hybrid advanced control of a flexible multipurpose continuous pharmaceutical tablet manufacturing process via direct compaction. Oral presentation at ESCAPE 23, Finland, 9 – 12 June.
37. Ramachandran, R., **Singh, R.**, Sahay, A., Ierapetritou, M., Muzzio F. (2013). Modeling and Control of a Continuous Direct Compaction Pharmaceutical Process. Oral presentation at Tenth Annual IFPAC/QbD/PAT Summit, Carolina, Puerto Rico, 18 – 19 June.
36. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2013). Hybrid advanced control of a flexible multipurpose continuous pharmaceutical tablet manufacturing process via direct compaction. Poster presentation at Advanced Process Modelling Forum (APM), New York, USA, 5 – 6 June.
35. Ramachandran, R., Sen, M., Barrasso, D., Chaudhury, A., **Singh, R.**, Oka, S. (2013). Population balance modeling of pharmaceutical processes featuring multi-scale approach of integrated flowsheet models and validation. Oral presentation at 5th International Conference on Population Balance Modeling, Bangalore, India, 11 – 13 September.
34. **Singh, R.**, Paul Brodbeck, Ramachandran, R. (2013). Advanced MPC based closed-loop control of a continuous pharmaceutical tablet manufacturing process using PAT on-line spectral analysis. Workshop at Emerson global user exchange, Grapevine, Texas, USA, 30 September– 4 October.
33. **Singh, R.**, Oka, S., Rogers, A., Ramachandran, R., Marianthi Ierapetritou, Fernando Muzzio, F. (2013). Development of infrastructure for predictive model control of continuous pharmaceutical manufacturing. Analytical Methods for Process and Product Quality, Virtual Meeting, Pharmaceutical Manufacturing, Putman Media, Inc., USA, 3rd October. <http://www.putmanmedia.com/our-brands/pharmaceutical-manufacturing/downloads-7>.
32. Sahay, A., Krizia Karry, K., Oka, S., **Singh, R.**, Roman, A., Colón, Y.M., Ramachandran, R., Muzzio, F. J., Romañach, R. J. (2013). NIR in Continuous Mixing: Transitioning from Monitoring to Control. On-Demand: Analytical Methods for Small Molecule Pharmaceutical Product & Process Optimization, Virtual Meeting, Pharmaceutical Manufacturing, Putman Media, Inc., USA, 1st October. <http://www.putmanmedia.com/our-brands/pharmaceutical-manufacturing/downloads-7>.

Year 2012

31. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2012). Design and implementation of an efficient control system in a continuous pharmaceutical manufacturing process via roller compaction. Oral presentation at AIChE annual meeting, Pittsburgh, PA, USA, 28th October - 2nd November.
30. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2012). Plant-wide hybrid model predictive control of a continuous pharmaceutical tablet manufacturing process via direct compaction. Oral presentation at AIChE annual meeting, Pittsburgh, PA, USA, 28th October - 2nd November.
29. Sen, M., Chaudhury, A., John, J., **Singh, R.** (2012). Ramachandran, R. Multi Scale Flow sheet Model for Downstream Processes in Production of Active Pharmaceutical Ingredient. Oral presentation at AIChE annual meeting, Pittsburgh, PA, USA, 28th October - 2nd November
28. **Singh, R.**, Gernaey, K. V., Gani, R., Woodley, J. M. (2012). Adaptive continuous template based novel manufacturing technique for faster manufacturing of new APIs for clinical trials. Oral presentation at AIChE annual meeting, Pittsburgh, PA, USA, 28th October - 2nd November
27. **Singh, R.**, Raquel Rozada-Sanchez, R., Dean, W., Perkins, J., Muller, F., Godfrey, A., Gernaey, K. V., Gani, R., Woodley, J. M. (2012). A generic process template for continuous pharmaceutical production. 11th International Symposium on Process Systems Engineering conference (PSE2012), **Singapore**, 15-19 July.
26. **Singh, R.**, Chaudhury, A., Ramachandran, R., Ierapetritou, M. (2012). Model-based control of an integrated and continuous downstream pharmaceutical process. Oral presentation at IFPAC 2012, Baltimore, MD, USA, 22-25 January.

Year 2011

25. **Singh, R.**, Rozada-Sanchez, R., Wrate, T., Muller, F., Gernaey, K. V., Gani, R., Woodley, J. M. (2011). Substrates adoption methodology (SAM) to achieve “Fast, Flexible, Future (F³)” pharmaceutical production processes”. Oral presentation at ECCE8 conference, Session: F³ Factory (Designing reaction), P 36, Berlin, **Germany**, 25-29 September.
24. Haas-Santo, K., Vankayala, B., Dittmeyer, R., **Singh, R.**, Gernaey, K. V., Gani, R., Woodley, J. M., Rozada-Sanchez, R., Muller, F. (2011). Development of a fast and flexible generic process for the reduction of nitro compounds. Oral presentation at ECCE8 conference, Session: F³ Factory (Designing reaction), P 36, Berlin, **Germany**, 25-29 September.
23. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2011). Systematic Procedure for Generating Operational Policies to Achieve Target Crystal Size Distribution (CSD) in Batch Cooling Crystallization, Oral presentation at ICMSAO (International Conference on Modeling, Simulation and Applied Optimization), Kuala Lumpur, **Malaysia**, 19-21 April.
22. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2011). Systematic Modeling and Crystal Size Distribution Control for Batch Cooling Crystallization Processes”, Oral presentation at EuroPACT 2011, Session: Novel Process Design and Control Strategies, P 21, Paper no. 81, Glasgow, **UK**, 27 – 29 April.
21. **Singh, R.**, Rozada-Sanchez, R., Wrate, T., Muller, F., Gernaey, K. V., Gani, R., Woodley, J. M. (2011). A retrofit strategy to achieve “Fast, Flexible, Future (F³)” pharmaceutical production processes”, Poster presentation at ESCAPE 21, Session: Synthesis/Design, P 26, **Greece**, 29 May– 1 June.
20. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2011). Systematic Modeling of Generic Multi-dimensional Model-based System for Batch Cooling Crystallization Operations. Oral presentation at ESCAPE 21, Session: Multi-scale Modelling III, P 53, **Greece**, 29 May– 1 June.

Year 2010

19. **Singh, R.**, Gernaey, K. V., Gani, R., Woodley, J. M. (2010). Systematic Framework for Design and Adaption of “Flexible, Fast, and Future (F³) Production Processes. Oral presentation at AIChE annual meeting, Salt Lake city, Utah, USA, 7 - 12 November.
18. **Singh, R.**, Gernaey, K. V., Gani, R., Woodley, J. M. (2010). An ontological knowledge-based system for identification of efficient chemical production routes ”, Oral presentation at AIChE annual meeting (530c), Session: Cyberinfrastructure and Informatics for Knowledge Management, Salt Lake city, Utah, USA, 7 - 12 November.

17. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2010). A generic multidimensional model-based framework for batch cooling crystallization process. Oral presentation at AIChE annual meeting (164d), Session: Particle Formation and Crystallization Processes From Liquids, Slurries, and Emulsions II. Salt Lake city, Utah, **USA**, 7 - 12 November.
1. **Singh, R.**, Samad, N. A. F. A., Sin, G., Gernaey, K. V., Gani, R. (2010). Systematic method and tool for design, analysis &/or validation of PAT systems. Oral presentation at APACT-10, Manchester, **UK**, 28 - 30 April 2010.
15. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2010). Control of process operation and monitoring of product qualities through generic model-based in batch cooling crystallization. Oral presentation at ESCAPE 20, Ischia, Naples, **Italy**, 6 – 9 June 2010.
14. Muller, F., Davison, S., Montague, G. A., Martin, E. B., **Singh, R.**, Gernaey, K. V., Gani, R., Woodley, J. M. (2010). F³ process design for fine chemical and Pharmaceutical transformations. Oral presentation at CHISA2010 - ECCE7 conference, Prague, **Czech Republic**, 28August – 1st September, 2010.
13. **Singh, R.**, Gernaey, K. V., Gani, R. (2010). Systematic computer-aided method and tool (ICAS-PAT) for design, analysis &/or validation of process monitoring and analysis systems (PAT systems). Oral presentation at CHISA2010 - ECCE7 conference, Prague, **Czech Republic**, 28August – 1st September, 2010.
12. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2010). A Generic Model-Based Framework for Batch Cooling Crystallization Processes. Poster presentation at PBM1010 (4th International Conference on Population Balance Modeling), Session P2: Crystallization, Berlin, **Germany**, September 15 – 17, 2010.

Years 2009-2007

11. **Singh, R.**, Gernaey, K. V., Gani, R. (2009). ICAS-PAT: A new software tool for systematic design/validation of process monitoring and analysis systems (PAT systems). APACT-09, Glasgow, **UK**, 05 - 07 May 2009.
10. **Singh, R.**, Gernaey, K. V., Gani, R. (2009). A software tool for design of process monitoring and analysis systems”, Oral presentation at ESCAPE19, Cracow, **Poland**, 14 – 19 June 2009.
09. **Singh, R.**, Samad, N. A. F. A., Sin, G., Gernaey, K. V., Gani, R. (2009). Application of ICAS-PAT on design of process monitoring and control system for a batch cooling crystallization process through hybrid multiscale model-based analysis. Oral presentation at AIChE annual meeting, Nashville, TN, **USA**, 8 – 13 November 2009.
08. **Singh, R.**, Gernaey, K. V., Gani, R. (2008). Off-line design of PAT systems for on-line applications”, Oral presentation at ESCAPE18, Lyon, **France**, June 2008.
07. Gernaey, K. V., Sin, G., Albo, E., Woodley, J. M., **Singh, R.**, Gani, R. (2008). Application of mechanistic models within a PAT framework. Oral presentation at ISPE, Malmö, Sweden, 1st October 2008.
06. **Singh, R.**, Gernaey, K. V., Gani, R. (2008). A model-based framework for systematic product quality monitoring and control”, Oral presentation at AIChE annual meeting (710e), Philadelphia, PA, **USA**, 16 – 21 November 2008.
05. **Singh, R.**, Gernaey, K. V., Gani, R. (2008). A software tool for design of process monitoring and analysis systems. Poster presentation at AIChE annual meeting, (577b), **Philadelphia**, PA, USA, 16 – 21 November 2008.
04. **Singh, R.**, Gernaey, K. V., Gani, R. (2007). Model-based Computer Aided Framework for Design of Process Monitoring and Analysis Systems. Oral presentation at APACT-07, Edinburgh, **UK**, 01 - 04 May 2007.
03. **Singh, R.**, Gernaey, K. V., Gani, R. (2007). Design of Process Monitoring and Analysis Systems, using a Model-based Computer Aided Framework. Oral presentation at ECCE6, Copenhagen, **Denmark**, 16 – 21 September 2007.
02. **Singh, R.**, Gernaey, K. V., Gani, R. (2007). “Design of Process Monitoring and Analysis Systems”, Oral presentation at AIChE annual meeting (556a), Salt Lake city, Utah, **USA**, 3 - 9 Nov. 2007.
01. **Singh, R.**, Gernaey, K. V., Gani, R. (2007). Supporting Tools for Design and Validation of PAT system. Poster presentation at AIChE annual meeting (517m), Salt Lake city, Utah, **USA**, 3 – 9 Nov. 2007.

5. Invited industrial/academic/regulatory presentations

1. **Singh, R. (2017).** Advanced control and data management of continuous pharmaceutical manufacturing process. Invited presentation at SynTQ user group meeting, **Optimal company**, Arlington, VA (Washington DC), USA, 25 - 26 April.
2. **Singh, R. (2015).** Application of synTQ for real time automatic advanced control of continuous pharmaceutical tablet manufacturing process. Invited presentation at SynTQ user group meeting, **Optimal company**, Arlington, VA (Washington DC), USA, 29 - 30 January.
3. Ramachandran, R., **Singh, R.**, Ierapetritou, M. (2015). Control Systems in Continuous Manufacturing. BMS-Rutgers Symposium, **Bristol-Myers Squibb (BMS) Company**, New Jersey, USA, 23 June 2015.
4. Barrasso, D., Chaudhury, A., **Singh, R.**, Ramachandran, R. (2013). Multi-scale Modeling of Particulate Processes. University of leads, UK, 25 June 2013.
5. Ierapetritou, M., **Singh, R. (2012).** Control theory and implementation to a continuous tablet manufacturing process. Invited presentation at US Food and Drug Administration (FDA), USA, November 2012.
6. **Singh, R. (2010).** Model-based Computer Aided Framework for Design of Process Monitoring and Analysis Systems (PAT systems). invited presentation given at Sartorius Company, Göttingen, Germany, 6th August, 2010.
7. **Singh, R.**, “Systematic methods and tool for PAT system design”, invited presentation given at Novo Nordisk A/S, Denmark, 5th October, 2010.
8. **Singh, R.**, “Systematic Framework for Design, Analysis and Validation of PAT systems”, invited presentation given at MATLS (Multivariate Analysis for the Technical and Life Sciences) meeting, Technical University of Denmark, Denmark, 17th November, 2010.

6. Conducted workshops

1. **Singh, R. (2022).** Workshop on “RTD toolbox” for US Food and Drug Administration, Virtual, 20th April 2022.
2. **Singh, R. (2021).** Workshop on “RTD Based Digital Twin model of Continuous Pharmaceutical Manufacturing Process” for US Food and Drug Administration, Virtual, 6th December 2021.
3. **Singh, R. (2021).** AIChE Workshop on “Covid-19: A Digital Twin of Flexible Modular Continuous API Manufacturing Process”, at Pandemic Advance Capabilities & Engineering (PACE) Workshops: Solutions in the Aftermath of COVID, Session 3: Strengthening the Supply Chain. Virtual, 17th November 2021.
4. **Singh, R. (2021).** Workshop on “Integrated flowsheet modelling” for Vertex, Virtual, 1st October 2021.
5. **Singh, R.**, “Implementation of the control system into the CM pilot-plant” at Compaction Simulation Forum, New Brunswick, New Jersey, 3rd June 2019.
6. **Singh, R.**, “Pharmaceutical process control” at Industrial Advisory Board Meeting of ERC-SOPS, Rutgers University, 17th October 2017.
7. **Singh, R.**, Ramachandran, R. Closed-loop Process Control of Pharmaceutical Manufacturing Processes. **Bristol-Myers Squibb (BMS)**, 20 July 2013.
8. **Singh, R.**, “implementation of PID and advanced model predictive controller to the continuous tablet manufacturing process” at Industrial Advisory Board Meeting of ERC-SOPS, Purdue University, 14th May 2013.
9. **Singh, R.**, “application of ICAS-PAT software for design of PAT systems”, workshop at Annual CAPEC external meeting, 9 – 11 June 2008.
10. **Singh, R.**, “Design of a control system for continuous manufacturing of pharmaceuticals” at Industrial Advisory Board Meeting of ERC-SOPS, Samuel Riggs IV Alumni Center College Park, MD, 21 November 2013.
11. **Singh, R.**, “Integration of Prediction from a Multivariate Sensor into a Process Control System” at Industrial Advisory Board Meeting of ERC-SOPS, Samuel Riggs IV Alumni Center College Park, MD, 21 November 2013.

7. Thesis Supervised (few examples)

1. Das, P. (2024). Advanced CFD modelling of continuous manufacturing of drug substance and product. Being supervised by Dr. Fernando Muzzio and **Dr. Ravendra Singh**. PhD Thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
2. Das, P. (2024). Experimental characterization and advanced modelling of homogenizer used in continuous injectable manufacturing process. Being supervised by Dr. Fernando Muzzio and **Dr. Ravendra Singh**. PhD Thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
3. Kritikos, T. (2023). Mechanistic modeling and validation of multi-scale flow systems for process intensification. Supervised by Dr. George Tsilomelekis and **Dr. Ravendra Singh**. PhD Thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
4. Dashank Gohil (2021). Development of control strategy for bioreactor and refill strategy of feeding system. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
5. Yash Melkeri (2020). Model-based analysis and dynamic optimization of feeder refill strategy. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
6. Fernando Nunes de Barros (2018). Strategies for process control and tablet diversion in a direct compaction process. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
7. Aparajith Bhaskar (2018). Implementation of an Advanced Control Strategy into a Continuous Direct Compaction Pharmaceutical Tablet Manufacturing Process. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
8. Matthew Billups (2018). Modeling, Control and Material Traceability in Continuous Pharmaceutical Manufacturing. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
9. Glinka Cathy Pereira (2017). Combined Feed-forward/Feed-back Control of an Integrated Continuous Granulation Process. Supervised by **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
10. Shishir Vadodaria (2016). Correlation of compression models to material properties: expanding pharmaceutical modeling techniques. Supervised by Dr. Marianthi G. Ierapetritou and **Dr. Ravendra Singh**. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.