

## Ravendra Singh, PhD

Assistant Research Professor, C-SOPS, Department of Chemical and Biochemical Engineering  
Rutgers, The State University of New Jersey, 98 Brett Road, Piscataway, NJ 08854, USA  
**Email:** ravendra.singh@rutgers.edu; **Tel.:** (001)8484454944 (o); **Fax:** (001)732-445-2581  
**Websites:** <http://cbe.rutgers.edu/faculty>; <http://ravendrasingh.wixsite.com/ppse>

### 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 domain: 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 **Assistant Research Professor**  
Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA  
**Principal/Co-principal investigator of different projects**
- 2011 – 2015 **Post Doctoral associate**  
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 – F<sup>3</sup> 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 (75 published + >15 under review/submission/preparation); Book (1); Book chapters (12); International conference presentations (119); Citations>2074, h-index>23, i10-index >43.

## 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 as a PI/Co-PI (Currently active projects are highlighted with green color)**

1. **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**.
2. **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**.
3. **2020 – 2022: CESMII (granted)**  
Using Smart Manufacturing to enable energy-efficient manufacturing of pharmaceutical products.  
**Role:** **Co-PI**. Source: CESMII. Amount: **\$1,134,022**.
4. **2022 – 2024: Food & Drug Administration (FDA) (granted)**  
Knowledge Management for Continuous Manufacturing  
**Role:** Co-PI. Source: FDA. Amount: \$649835.
5. **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.**

6. **2020 -2022: Food & Drug Administration (FDA) (granted)**  
Development and Round-robin Verification of Dynamic RTD Models for the On-line Product Quality Analysis.  
**Role: Co-PI.** Source: FDA. Amount: **\$2.4 Million.**
7. **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.**
8. **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.**
9. **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.**
10. **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.**
11. **2018-2022: Food & Drug Administration (FDA) (granted)**  
Advanced Bio-manufacturing  
**Role: Co-PI.** Source: FDA. Amount: **\$1.8 Million**
12. **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.**
13. **2018 -2019: Siemens (granted)**  
Cyber-physical security in the Pharmaceutical Manufacturing Process  
**Role: PI** (and project lead). Source: Siemens Company. Amount: **\$75,000.**
14. **2018 Diversitech Corporation (granted)**  
Fluid bed drying trials  
**Role: PI.** Source: **Diversitech** Company. Amount: **\$1600.**
15. **2018 Rutgers Global International Travel Grant (granted)**  
**Role: PI.** Amount: **\$750.**
16. **2018 -2019: CNH (granted)**  
Wear prediction and validation with fine particle interaction  
**Role: Co-PI.** Source: CNH Company. Amount: **\$118608.**
17. **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.**
18. **2017: Grant to stablish international collaboration (granted)**  
Grants to Support the Initiation of International Collaboration.  
**Role: Co-PI.** Source: Hamburg University of Technology. Amount: **€1610.**
19. **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**.

**20. 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**.

**Co-investigator but not PI/Co-PI (Active projects)**

**1. 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**.

**2. 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**.

**3. 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.

**4. 2019 Johnson & Johnson (granted)**

Modular Digital Twin Generator. Role: **Co-Investigator/Consultant**. Amount: **\$1.5 Million**.

**Grant received as a faculty advisor**

**1. 2020 ARESTY (Rutgers) (Granted)**

Financial support of two undergrad students

Role: **Advisor** (students name: Hira Javed and Naomi Arias-Fernandez). Source: ARESTY program. Amount: **Full financial coverage of two students**.

**2. 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**.

**3. 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**.

**4. 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**.

5. **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.**
6. **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.**
7. **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:** F<sup>3</sup> 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. Gernaney.
- **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)**

- 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, 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, 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.
- 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).
- Developed **online course** on “process modelling and control” for US Food and Drug Administration (FDA).
- Developed training course for USP.
- 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 (2):**

- 2021 –2022: Ardeshir Tabrizi, Rutgers University. Title: API manufacturing.
- 2016 - 2021: Andrés David Román Ospino, Rutgers University. Title: PAT applications.

### **PhD Students (5): Co-advisor/collaborator**

- 2020 – Present: Athanasios Kritikos
- Title: CFD modelling.
- 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 (29):**

- 2020 - Present (2): Rima Rahman (Thesis), Siddhi Patel.
- 2019 - 2021 (4): Alexander Riveron, Dashank Gohil (Thesis), Colten Schreiner, Kazeem Oladele,
- 2018 - 2020 (4): Bi Yming, Jiabin Zhou (ECE), George Hana, Aril Botadra (ISE).
- 2017-2019 (5): Yash Melkeri (Thesis), Yunseok Choi, 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 (11):**

2020 – Present (2): Brenton Bongcaron, 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 150 reviews of Journal manuscripts. Active chair/co-chair of AIChE conference. Member of doctoral and master thesis defense committee at Rutgers. Member of 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 (12<sup>th</sup> June, 2010); Northern India Patrika (12<sup>th</sup> June 2010); Hindustan Times (12<sup>th</sup> June 2010); Danik Jagran (11<sup>th</sup> June 2010); Amar Ujala (10<sup>th</sup> June 2010); Amrit Prabhat (12<sup>th</sup> June 2010).



## Ravendra Singh, PhD

C-SOPS, Department of Chemical and Biochemical Engineering  
Rutgers University, 98 Brett Road, Piscataway, NJ 08854, USA

Email: ravendra.singh@rutgers.edu; Tel.: (001)8484454944 (o); Fax: (001)732-445-2581  
<https://cbe.rutgers.edu/faculty>; <https://ravendrasingh.wixsite.com/ppse>

---

### 1. International scientific articles

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*. Submitted.
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>.
73. Sánchez-Paternina, A., Martínez-Cartagena, P., Li, J., Scicolone, J., **Singh, R.**, Lugo, Y.C., Románach, R. J., Muzzio, F.J., Román-Ospino, A. D. (2021). Residence time distribution as a traceability method for lot changes in a pharmaceutical continuous manufacturing system. *International Journal of Pharmaceutics*, 611, 121313. <https://doi.org/10.1016/j.ijpharm.2021.121313>
72. Román-Ospino, A. D., Baranwal, Y., Li, J., Vargas, J., Igne, B., Bate, S., Brouckaert, D., Chauchard, F., Hausner, D., Ramachandran, R., **Singh, R.**, Muzzio, F. J. (2021). Sampling optimization for blend monitoring of a Low Dose formulation in a Tablet Press Feed Frame Using Spatially Resolved Near-Infrared Spectroscopy. *International Journal of Pharmaceutics*, 602, 120594. <https://doi.org/10.1016/j.ijpharm.2021.120594>.
75. Chopda, V., Gyorgypal, A., Yang O., Singh, R., Ramachandran, R., Zhang, H., Tsilomelekis, G., Chundawat, S., Ierapetritou, M. (2021). Recent Advances in Integrated Process Analytical Techniques, Modeling, and Control Strategies to Enable Continuous Biomanufacturing of Monoclonal Antibodies. *Journal of Chemical Technology and Biotechnology*. <https://doi.org/10.1002/jctb.6765>.
70. Tanimura, S., **Singh, R.\***, Román-Ospino, A. D., Ierapetritou, M. (2021). Residence time distribution modelling and in line monitoring of drug concentration in a tablet press feed frame containing dead zones. *International Journal of Pharmaceutics*, 592, 120048. [10.1016/j.ijpharm.2020.120048](https://doi.org/10.1016/j.ijpharm.2020.120048).
69. Singh, R. (2021). Cyber-Physical Security (CPS) Tool for Continuous Pharmaceutical Manufacturing Process. *Pharma Focus Asia*. Issue 44, 41-49. <https://www.pharmafocusasia.com/information-technology/cyber-physical-security-tool>.
68. Singh, R. (2021). Predicting tablet potency in continuous manufacturing. A modular toolbox enables residence time distribution-based control for continuous pharmaceutical manufacturing. *Pharmaceutical Technology*. 44-48. <https://www.e-digitaleditions.com/i/1420709-pharmaceutical-technology-oct-2021-api/44?>
67. Furukawa, R., **Singh, R.\***, Ierapetritou, M. (2021). Experimental investigation and modelling of tensile strength of pharmaceutical tablets based on shear force applied by feed frame paddles. *International Journal of Pharmaceutics*. 606, 120908. <https://doi.org/10.1016/j.ijpharm.2021.120908>.
66. Furukawa, R., **Singh, R.\***, Ierapetritou, M. (2020). Effect of material properties on the residence time distribution (RTD) of a tablet press feed frame. *International Journal of Pharmaceutics*, 591, 119961. <https://doi.org/10.1016/j.ijpharm.2020.119961>.
65. Román-Ospino, A. D., Tamrakar, A., Igne, B., Dimaso, E. T., Airiau, C., Clancy, D. J., Pereira, G., Muzzio, F. J., **Singh, R.**, Ramachandran, R. (2020). Characterization of NIR interfaces for the feeding and in-line monitoring of a continuous granulation process. *International Journal of Pharmaceutics*, 574, 118848. doi: <https://doi.org/10.1016/j.ijpharm.2019.118848>.

64. **Singh, R.\* (2020)**. The cyber-physical security of pharmaceutical manufacturing processes. *Pharma.*, Issue 38, 53-57.
63. Metta, N., Ghijs, M., Schafer, E., Kumar, A., Cappuyns, P., Assche, I. V., **Singh, R.**, Ramachandran, R. De Beer, T., Ierapetritou, M., Nopens, I. (2019). Dynamic flowsheet model development and sensitivity analysis of a continuous pharmaceutical tablet manufacturing process using the wet granulation route. *Processes Journal*, 7(4), 234.
62. **Singh, R.\* (2019)**. Systematic framework for implementation of RTD based control system into continuous pharmaceutical manufacturing pilot-plant. *Pharma*. Issue 34, 43-46.
61. Billups, M., **Singh, R.\* (2018)**. Systematic framework for implementation of material traceability into continuous pharmaceutical tablet manufacturing process. *Journal of Pharmaceutical Innovation*. <https://doi.org/10.1007/s12247-018-9362-9>.
60. Bhaskar, A., **Singh, R.\* (2018)**. Residence time distribution (RTD) based control system for continuous pharmaceutical manufacturing process. *Journal of Pharmaceutical Innovation*. DOI: 10.1007/s12247-018-9356-7.
59. Pereira, G., Muddu, S. V., Román, A., Clancy, D., Igne, B., Airiau, C., Muzzio, F. J., Ierapetritou, M., Ramachandran, R., **Singh, R.\* (2018)**. Combined Feed-forward/Feed-back Control of an Integrated Continuous Granulation Process. *Journal of Pharmaceutical Innovation*. DOI: 10.1007/s12247-018-9347-8.
58. Shaikh, R., **Singh, R.**, Walker, G. M., Croker, D. M. (2018). Pharmaceutical Cocrystals: An outlook on product development. *Trends in pharmaceutical sciences*. <https://doi.org/10.1016/j.tips.2018.10.006>.
57. Metta, N., Verstraeten, M., Ghijs, M., Kumar, A., Schafer, E., **Singh, R.**, De Beer, T., Nopens, I., Ierapetritou, M., Ramachandran, R. (2018). Model development and prediction of particle size distribution, density and friability of a comilling operation in a continuous pharmaceutical manufacturing process. *International Journal of Pharmaceutics*, 549 (1-2), 271-282.
56. Cao, H., Mushnoori, S., Higgins, B., Kollipara, C., Fermier, A., Hausner, D., Jha, S., **Singh, R.**, Ierapetritou, M., and Ramachandran, R. (2018). Systematic Framework for Data Management and Integration in a Continuous Pharmaceutical Manufacturing Processing Line. *Processes Journal*. 6(5), 53. <https://doi.org/10.3390/pr6050053>.
55. Escotet-Espinoza, M. S., Vadodaria, S., **Singh, R.**, Muzzio, F. J., Ierapetritou, M. G. (2018). Modeling the effects of material properties on tablet compaction: A building block for controlling both batch and continuous pharmaceutical manufacturing processes. *International Journal of Pharmaceutics*, 543 (1-2), 274-287.
54. Moghtadernejad, S., Escotet-Espinoza, M. S., Oka, S., **Singh, R.**, et al. (2018). A Training on: Continuous Manufacturing (Direct Compaction) of Solid Dose Pharmaceutical Products. *Journal of Pharmaceutical Innovation*, 13(2), 155-187. <https://doi.org/10.1007/s12247-018-9313-5>.
53. Billups, M., **Singh, R.\* (2018)**. Material Traceability in Continuous Pharmaceutical Tablet Manufacturing. *Pharmaceutical Technology* 42 (2), 32-35, 59.
52. **Singh, R.\* (2018)**. Residence Time Distribution (RTD) model: Novel applications to continuous pharmaceutical manufacturing. *Pharma*. Issue 32, 39-42.
51. **Singh, R.\* (2018)**. Drug concentration assurance of continuous tablet manufacturing: Advanced process control strategy. *Pharma*. Issue 31, 34-38.
50. **Singh, R.\* (2018)**. System engineering for a novel continuous pharmaceutical manufacturing process. *Pharma*. Issue 30. <https://www.pharmafocusasia.com/manufacturing/system-engineering-pharmaceutical-manufacturing-process>.
49. Barros, F. N., Bhaskar, A., **Singh, R.\* (2017)**. A validated model for design and evaluation of control architectures for continuous tablet compaction process. *Processes Journal*, 5(4), 76. doi:10.3390/pr5040076
48. Bhaskar, A., Barros, F. N., **Singh, R.\* (2017)**. Development and implementation of an advanced model predictive control system into continuous pharmaceutical tablet compaction process. *International Journal of Pharmaceutics*, 534 (1-2), 159-178. <https://doi.org/10.1016/j.ijpharm.2017.10.003>.
47. Haas, N. T., Ierapetritou, M., **Singh, R.\* (2017)**. Advanced model predictive feedforward/feedback control of a tablet press. *Journal of Pharmaceutical Innovation*, 12 (2), 10-123. DOI 10.1007/s12247-017-9276-y.

46. **Singh, R.\* (2017)**. A novel continuous pharmaceutical manufacturing pilot-plant: Advanced model predictive control. *Pharma*, Issue 28, PP 58-62. <https://www.pharmafocusasia.com/manufacturing/novel-continuous-pharmaceutical-manufacturing>.
45. Wang, Z., Escotet-Espinoza, M. S., **Singh, R.**, Ierapetritou, M. G. (2017). Surrogate-Based Optimization for Pharmaceutical Manufacturing Processes. *Computer Aided Chemical Engineering*, 40, 2797-2802. <https://doi.org/10.1016/B978-0-444-63965-3.50468-2>
44. Román-Ospino, A. D., **Singh, R.**, Ierapetritou, M., Ramachandran, R. Méndez, R., Ortega, C., Muzzio, F. J., Romañach, R. J. (2016). Near Infrared Spectroscopic Calibration Models For Real Time Monitoring Of Powder Density. *International Journal of Pharmaceutics*, 512 (1), 61-74. <http://dx.doi.org/10.1016/j.ijpharm.2016.08.029>
43. Wu, S., Panikar, S. S., **Singh, R.**, Zhang, J., Donepudi, A., Glasser, B., Ramachandran, R. (2016). Systematic framework to monitor mulling processes using Near Infrared spectroscopy. *Advanced Powder Technology*, 27 (4), 1115-1127. <http://dx.doi.org/10.1016/j.apt.2016.03.022>
42. **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. *Computer Aided Chemical Engineering*, 38, 1473-1478. <http://dx.doi.org/10.1016/B978-0-444-63428-3.50250-2>
41. **Singh, R.**, Román-Ospino, A. D., Romañach, R. J., Ierapetritou, M., Ramachandran, R. (2015). Real time monitoring of powder blend bulk density for coupled feed-forward/feed-back control of a continuous direct compaction tablet manufacturing process. *International Journal of Pharmaceutics*, 495, 612-625. <http://dx.doi.org/10.1016/j.ijpharm.2015.09.029>
40. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R. (2015). A combined feed-forward/feed-back control system for a QbD based continuous tablet manufacturing process. *PROCESSES Journal*, 3, 339-356. <http://dx.doi.org/10.3390/pr3020339>
39. **Singh, R.**, Sen, M., Ierapetritou, M., Ramachandran, R. (2015). Integrated moving horizon based dynamic real time optimization and hybrid MPC-PID control of a direct compaction continuous tablet manufacturing process. *Journal of Pharmaceutical Innovation*, 10 (3), 233-253. <http://dx.doi.org/10.1007/s12247-015-9221-x>
38. Simon, L. L., .. **Singh, R.**, et al. (2015). Assessment of Recent Process Analytical Technology (PAT) Trends: A Multi-author Review. *Organic Process Research & Development*, 19, 3-62. <http://pubs.acs.org/doi/abs/10.1021/op500261y>
37. **Singh, R.**, Zhang, J., Ierapetritou, M., Ramachandran, R. (2015). Designing a novel continuous manufacturing plant with superior monitoring and control. *European Pharmaceutical Review*, 20(6), 37-41.
36. Sen, M., **Singh, R.**, Ramachandran, R. (2015). Model Manufacturing. *The Medicine Maker*, February, 05, 42-45.
35. Escotet-Espinoza, M. S., **Singh, R.**, Sen, M., O'Connor, T., Lee, S., Chatterjee, S., Ramachandran, R., Ierapetritou, M., Muzzio, F. (2015). Flowsheet Models Modernize Pharmaceutical Manufacturing Design and Risk Assessment, *Pharmaceutical Technology* 39 (4), 34-42.
34. **Singh, R.**, Muzzio, F., Ierapetritou, M., Ramachandran, R. (2015). Plant-wide control of a continuous tablet manufacturing for Quality-by-Design based pharmaceutical manufacturing. *Computer Aided Chemical Engineering*, 37, 2183 - 2188. <http://dx.doi.org/10.1016/B978-0-444-63576-1.50058-3>
33. Karry, K. M., **Singh, R.**, Muzzio, F. J. (2015). Fit-for-Purpose Miniature NIR Spectroscopy for Solid Dosage Continuous Manufacturing. *American Pharmaceutical Review*, 18(4), 64 - 67.
32. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2015). The scopes of PAT in real-time advanced control of tablet quality. *European Pharmaceutical Review* 20(2), 76-80.
31. **Singh, R.**, Sahay, A., Karry, K. M., Muzzio, F., Ierapetritou, M., Ramachandran, R. (2014). Implementation of a hybrid MPC-PID control strategy using PAT tools into a direct compaction continuous pharmaceutical tablet manufacturing pilot-plant. *International Journal of Pharmaceutics*, 473, 38-54. <http://dx.doi.org/10.1016/j.ijpharm.2014.06.045>
30. **Singh, R.**, Sahay, A., Fernando Muzzio, Ierapetritou, M., Ramachandran, R. (2014). A systematic framework for onsite design and implementation of the control system in continuous tablet manufacturing process.

29. **Singh, R.**, Barrasso, D., Chaudhury, A., Maitraye Sen, Ierapetritou, M., Ramachandran, R. (2014). Closed-Loop Feedback Control of a Continuous Pharmaceutical Tablet Manufacturing Process via Wet Granulation. *Journal of Pharmaceutical Innovation*, 9, 16-37. <http://dx.doi.org/10.1007/s12247-014-9170-9>
28. Sen, M., Barrasso, D., **Singh, R.**, Ramachandran, R. (2014). A Multi-Scale Hybrid CFD-DEM-PBM Description of a Fluid-Bed Granulation Process. *Processes Journal*, 2(1), 89-111. <http://dx.doi.org/10.3390/pr2010089>
27. Sen, M., **Singh, R.**, Ramachandran, R. (2014). Simulation based design of an efficient control system for the continuous purification and processing of active pharmaceutical ingredients. *Journal of Pharmaceutical Innovation*, 9, 65-81. <http://dx.doi.org/10.1007/s12247-014-9173-6>
26. Sen, M., **Singh, R.**, Ramachandran, R. (2014). A hybrid MPC-PID control system design for the continuous purification and processing of active pharmaceutical ingredients. *PROCESSES Journal*, 2, 392-418; <http://dx.doi.org/10.3390/pr2020392>.
25. Sen, M., Chaudhury, A., **Singh, R.**, Ramachandran, R. (2014). Two-dimensional population balance model development and validation of pharmaceutical crystallization processes. *American Journal of Modern Chemical Engineering*, 1, 13-29.
24. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2013). System-wide hybrid model predictive control of a continuous pharmaceutical tablet manufacturing process via direct compaction. *European Journal of Pharmaceutics and Biopharmaceutics*, 85(3), Part B, 1164-1182. <http://dx.doi.org/10.1016/j.ejpb.2013.02.019>
23. **Singh, R.**, Godfrey, A., Gregertsen, B., Muller, F., Gernaey, K. V., Gani, R., Woodley, J. M. (2013). Systematic substrate adoption methodology (SAM) for future flexible, generic pharmaceutical production processes. *Computers & Chemical Engineering Journal*, 58, 344 - 368. <http://dx.doi.org/10.1016/j.compchemeng.2013.07.010>
22. Sen, M., Dubey, A., **Singh, R.**, Ramachandran, R. (2013). Mathematical Development and Comparison of a Hybrid PBM-DEM description of a Continuous Powder Mixing Process. *Journal of Powder Technology*, <http://dx.doi.org/10.1155/2013/843784>.
21. Sen, M., Chaudhury, A., **Singh, R.**, John, J., Ramachandran, R. (2013). Multi-scale flowsheet simulation of an integrated continuous purification–downstream pharmaceutical manufacturing process. *International Journal of Pharmaceutics*, 445 (1-2), 29-38. <http://dx.doi.org/10.1016/j.ijpharm.2013.01.054>
20. Sen, M., Rogers, A., **Singh, R.**, Chaudhury, A., John, J., Ierapetritou, M., Ramachandran, R. (2013). Flowsheet optimization of an integrated continuous purification-processing pharmaceutical manufacturing operation. *Chemical Engineering Science*, 102, 56 – 66. <http://dx.doi.org/10.1016/j.ces.2013.07.035>
19. **Singh, R.**, Ierapetritou, M., Ramachandran, R (2013). Hybrid advanced control of a flexible multipurpose continuous pharmaceutical tablet manufacturing process via direct compaction. *Computer Aided Chemical Engineering*, 32, 757-762. <http://dx.doi.org/10.1016/B978-0-444-63234-0.50127-5>
18. Muzzio, F., **Singh, R.**, Chaudhury, A., Rogers, A., Ramachandran, R. Ierapetritou, M. (2013). Model-predictive design, control and optimization of pharmaceutical process. *Pharmaceutical Technology magazine*, 37(6), 40-41, 77.
17. **Singh, R.**, Sahay, A., Oka, S., Liu, X., Ramachandran, R., Ierapetritou, M., Muzzio, F. (2013). Online monitoring, advanced control and operation of robust continuous pharmaceutical tablet manufacturing process. *BioPharma magazine Asia*, 2(5), 18-25.
16. **Singh, R.**, Ierapetritou, M., Ramachandran, R. (2012). An engineering study on the enhanced control and operation of continuous manufacturing of pharmaceutical tablets via roller compaction. *International Journal of Pharmaceutics*, 438 (1-2), 307-326. <http://dx.doi.org/10.1016/j.ijpharm.2012.09.009>
15. Sen, M., **Singh, R.**, Vanarase, A., John, J., Ramachandran, R. (2012). Multi-dimensional population balance modeling and experimental validation of continuous powder mixing processes. *Chemical Engineering Science*, 18, 349-360. <http://dx.doi.org/10.1016/j.ces.2012.06.024>
14. **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. *Computer Aided Chemical Engineering*, 31, 715-719. <http://dx.doi.org/10.1016/B978-0-444-59507-2.50135-9>

13. **Singh, R.**, Boukouvala, F., Jayjock, E., Ramachandran, R. Ierapetritou, M., Muzzio, F. (2012). Flexible Multipurpose Continuous Processing: integration of process flow modeling for continuous processing of pharmaceutical solid dosage forms. PharmPro Magazine, Pharmaceutical Processing, 27(6), 22-25.
12. **Singh, R.**, Boukouvala, F., Jayjock, E., Ramachandran, R. Ierapetritou, M., Muzzio, F. (2012). Flexible Multipurpose Continuous Processing of Pharmaceutical Tablet Manufacturing Process. GMP news, European Compliance Academic (ECE), [http://www.gmp-compliance.org/ecanl\\_503\\_0\\_news\\_3268\\_7248\\_n.html](http://www.gmp-compliance.org/ecanl_503_0_news_3268_7248_n.html).
11. **Singh, R.**, Gernaey, K. V., Gani, R. (2010). ICAS-PAT: A Software for Design, Analysis & Validation of PAT Systems. Computers & Chemical Engineering Journal, 34(7), 1108-1136. <http://dx.doi.org/10.1016/j.compchemeng.2009.06.021>
10. **Singh, R.**, Gernaey, K. V., Gani, R. (2010). An ontological knowledge based system for selection of process monitoring and analysis tools. Computers & Chemical Engineering Journal, 34(7), 1137-1154. <http://dx.doi.org/10.1016/j.compchemeng.2010.04.011>
09. **Singh, R.**, Gernaey, K. V., Gani, R. (2009). Model-based computer-aided framework for design of process monitoring and analysis systems. Computers & Chemical Engineering Journal, 33(1), 22-42.
08. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2011). A generic multi-dimensional model-based system for batch cooling crystallization processes. Computers & Chemical Engineering Journal, 35(5), 828-843. <http://dx.doi.org/10.1016/j.compchemeng.2011.01.029>
07. 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. IEEE, 1-6. Print ISBN: 978-1-4577-0003-3. DOI: 10.1109/ICMSAO.2011.5775588.
06. Gani, R., **Singh, R.**, PAT Slowly Yielding to Broader QbD (2011). GEN: Genetic Engineering & Biotechnology News, 31(6), 40-41.
05. Samad, N. A. F. A., **Singh, R.**, Sin, G., Gernaey, K. V., Gani, R. (2011). Integration of Generic Multi-dimensional Model and Operational Policies for Batch Cooling Crystallization. Computer Aided Chemical Engineering, 29, 86-90. <http://dx.doi.org/10.1016/B978-0-444-53711-9.50018-3>
04. 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. Computer Aided Chemical Engineering, 28, 613-618. [http://dx.doi.org/10.1016/S1570-7946\(10\)28103-8](http://dx.doi.org/10.1016/S1570-7946(10)28103-8)
03. **Singh, R.**, Rozada-Sanchez, R., Wrate, T., Muller, F., Gernaey, K. V., Gani, R., Woodley, J. M. (2010). A retrofit strategy to achieve “Fast, Flexible, Future (F<sup>3</sup>)” pharmaceutical production processes. Computer Aided Chemical Engineering, 29, 291-295. <http://dx.doi.org/10.1016/B978-0-444-53711-9.50059-6>
02. **Singh, R.**, Gernaey, K. V., Gani, R. (2009). A software tool for design of process monitoring and analysis systems. Computer Aided Chemical Engineering, 26, 321-326. [http://dx.doi.org/10.1016/S1570-7946\(09\)70054-9](http://dx.doi.org/10.1016/S1570-7946(09)70054-9)
01. **Singh, R.**, Gernaey, K. V., Gani, R. (2008). Off-line design of PAT systems for on-line applications. Computer Aided Chemical Engineering, 25, 423-428. [http://dx.doi.org/10.1016/S1570-7946\(08\)80075-2](http://dx.doi.org/10.1016/S1570-7946(08)80075-2)

## **2. Book**

**Singh, R.**, Yuan, Z. (2018). Process Systems Engineering for Pharmaceutical Manufacturing. Volume 41, 1<sup>st</sup> 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.
  - **Singh, R. (2011). Milling process model.** Chapter 12.4 of book “Product and Process Modelling: A case study approach” edited by I Cameron & R. Gani. Publisher: Elsevier, pp 407-413.

- **Singh, R. (2011). Granulation process model.** Chapter 12.5 of book “Product and Process Modelling: A case study approach” edited by I Cameron & R. Gani. Publisher: Elsevier, pp 413-422.
  - **Singh, R. (2011). Pharmaceutical tablet pressing process model.** Chapter 12.6 of book “Product and Process Modelling: A case study approach” edited by I Cameron & R. Gani. Publisher: Elsevier, pp 422-430.
  - **Singh, R. (2011). Milk pasteurization process modeling.** Chapter 12.3 of book “Product and Process Modelling: A case study approach” edited by I Cameron & R. Gani. Publisher: Elsevier, pp 396-406.
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. (2021).** 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
  12. Razavi, S. M., Yohannes, B., **Singh, R.**, Gonzalez, M., Lee, H. P., Cuitiño, A. M. **(2021).** Continuous tableting. Book title: How to Design and Implement Powder-to-Tablet Continuous Manufacturing Systems. Editor: Fernando J. Muzzio. Publisher: Elsevier. ISBN: 9780128134795

#### **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, 1<sup>st</sup> 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 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, Hybrid: Boston (Nov. 7-11) and Virtual (Nov. 15-19).
107. **Singh, R., Lim, J., Collins, N., Muzzio, F. (2021).** A Digital Twin of Flexible Modular Continuous API Manufacturing Process. Oral presentation at AIChE, Hybrid: Boston (Nov. 7-11) and Virtual (Nov. 15-19).
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.
101. **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. **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 (3<sup>rd</sup> place).
68. Pereira, G., Román, A., Clancy, D., Igne, B., Airiau, C., Ierapetritou, Ramachandran, 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 50<sup>th</sup> 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., Romañach, 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, 3<sup>rd</sup> 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, 28<sup>th</sup> October - 2<sup>nd</sup> 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, 28<sup>th</sup> October - 2<sup>nd</sup> November.
29. Sen, M., Chaudhury, A., John, J., **Singh, R.**, 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, 28<sup>th</sup> October - 2<sup>nd</sup> 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, 28<sup>th</sup> October - 2<sup>nd</sup> 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 (F<sup>3</sup>)” pharmaceutical production processes”. Oral presentation at ECCE8 conference, Session: F<sup>3</sup> 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: F<sup>3</sup> 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 (F<sup>3</sup>)” 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 (F<sup>3</sup>) 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). F<sup>3</sup> process design for fine chemical and Pharmaceutical transformations. Oral presentation at CHISA2010 - ECCE7 conference, Prague, **Czech Republic**, 28August – 1<sup>st</sup> 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 – 1<sup>st</sup> 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. SynTQ user group meeting, **Optimal company**, Arlington, VA (Washington DC), **USA**, 25 - 26 April.
2. **Singh, R.**, “Model-based Computer Aided Framework for Design of Process Monitoring and Analysis Systems (PAT systems)”, invited presentation given at **Sartorius Company**, **Göttingen**, **Germany**, 6<sup>th</sup> August, 2010.

3. **Singh, R.**, “Systematic methods and tool for PAT system design”, invited presentation given at **Novo Nordisk A/S, Denmark**, 5<sup>th</sup> October, 2010.
4. **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.
5. Ierapetritou, M., **Singh, R.** Control theory and implementation to a continuous tablet manufacturing process. **US Food and Drug Administration (FDA), USA**, November 2012.
6. Barrasso, D., Chaudhury, A., **Singh, R.**, Ramachandran, R. Multi-scale Modeling of Particulate Processes. University of Leeds, UK, 25 June 2013.
7. **Singh, R. (2015)**. Application of synTQ for real time automatic advanced control of continuous pharmaceutical tablet manufacturing process. SynTQ user group meeting, **Optimal company**, Arlington, VA (Washington DC), **USA**, 29 - 30 January.
8. 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.

## **6. Conducted workshops**

1. **Singh, R.**, “Implementation of the control system into the CM pilot-plant” at Compaction Simulation Forum, New Brunswick, New Jersey, 3rd June 2019.
2. **Singh, R.**, “Pharmaceutical process control” at Industrial Advisory Board Meeting of ERC-SOPS, Rutgers University, 17th October 2017.
3. **Singh, R.**, Ramachandran, R. Closed-loop Process Control of Pharmaceutical Manufacturing Processes. **Bristol-Myers Squibb (BMS)**, 20 July 2013.
4. **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.
5. **Singh, R.**, “application of ICAS-PAT software for design of PAT systems”, workshop at Annual CAPEC external meeting, 9 – 11 June 2008.
6. **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.
7. **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**

1. Dashank Gohil (**2021**). Development of Control Strategy for Continuous Perfusion Bioreactor and Refill Strategy for Feeding System. Supervised by Dr. Ravendra Singh. Master thesis, Department of Chemical and Biochemical Engineering, Rutgers University, NJ, USA.
2. 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.
3. 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.
4. 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.

5. 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.
6. 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.
7. Vadodaria, S., **(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.