



## Rohit Ramachandran, PhD

Department of Chemical & Biochemical Engineering  
Rutgers, The State University of New Jersey  
98 Brett Road, Piscataway, NJ 08854, USA  
Tel: 1-848-445-6278, Email: [rohit.r@rutgers.edu](mailto:rohit.r@rutgers.edu)  
URL: <https://psl.rutgers.edu/>

---

### EDUCATION

- 2005 – 2008 **PhD, Chemical Engineering with Diploma of Imperial College (DIC)**  
*Centre for Process Systems Engineering (CPSE), Imperial College London*  
Thesis titled “Multi-scale Population Balance Modelling and Controllability of Granulation Processes”.  
Advisors: Dr. C. D. Immanuel
- 2003 – 2005 **M.Eng, Chemical Engineering**  
*National University of Singapore (NUS)*  
Thesis titled “Performance Analysis and Troubleshooting of Industrial Control Loops”.  
Advisors: Prof. S. Lakshminarayanan & Prof. G. P. Rangaiah
- 1999 – 2003 **B.Eng, Chemical Engineering (Honors) with a minor in Law**  
*National University of Singapore (NUS)*  
Thesis titled “Process Identification using Open-loop and Closed-loop Step Tests”.  
Advisors: Prof. S. Lakshminarayanan & Prof. G. P. Rangaiah

### PROFESSIONAL EXPERIENCE

- 2022 - Present **Professor I (with Tenure)**  
Department of Chemical and Biochemical Engineering  
Rutgers, The State University of New Jersey, USA
- 2017 - 2022 **Associate Professor (with Tenure) & Chancellor’s Scholar**  
Department of Chemical and Biochemical Engineering  
Rutgers, The State University of New Jersey, USA
- 2016-2017 **Associate Professor (with Tenure)**  
Department of Chemical and Biochemical Engineering  
Rutgers, The State University of New Jersey, USA
- 2010 - 2016 **Assistant Professor**  
Department of Chemical and Biochemical Engineering  
**Project Leader** – Control and Hardware Integration  
Engineering Research Center for Structured Organic Particulate Systems (ERC-SOPS)  
Rutgers, The State University of New Jersey, USA
- 2008 – 2009 **Postdoctoral Associate**  
**Department of Chemical Engineering, Massachusetts Institute of Technology, USA**  
Process Systems Engineering Laboratory, Novartis-MIT Centre for Continuous Manufacturing  
Advisor: Prof. P. I. Barton
- 2006 – 2007 **Visiting Researcher**  
(3 months) Department of Chemical Engineering, University of Queensland, Australia

### RESEARCH INTERESTS

Particle Technology, Process systems engineering; process control; Process Simulation; Process Optimization; Mathematical Modelling; Population Balance Modelling; Experimental Studies and Validation; Pharmaceutical Engineering; Particulate and Chemical Processes; Nonlinear Identification and Control; Nonlinear Dynamics and Chaos Theory, Biological Systems, High-Performance Computing.

## **HONORS & AWARDS**

2021	Recipient of Processes Journal Best paper award.
2018	Recipient of AIChE PD2M Drug Product QbD award.
2017	Recipient of Rutgers Board of Trustees award for research excellence
2017	Recipient of Chancellor's Scholar award for outstanding scholarship
2015	Recipient of Outstanding CBE Faculty Award
2015	Recipient of CBE Best Teacher/Mentor/Advisor award
2014	Recipient of NIPTE Young Investigator award
2014	Recipient of NSF CAREER award
2013	Recipient of PSE Model-based Innovation Prize
2013	Editorial Board of American Journal of Modern Chemical Engineering
2013	Recipient of best reviewer award for Computers & Chemical Engineering Journal
2012	Recipient of NIPTE Young Investigator award
2009	Recipient of International Fine Particle Research Institute (IFPRI)
2005	Institute of Electrical and Electronic Engineering (IEEE) honorary membership
2005	Recipient of the best tutor award for Advanced Chemical Engineering Thermodynamics
2004	Recipient of the NUS research scholarship award for academic excellence
2003	Recipient of the NUS research fee allowance + graduate student award for academic excellence

## **GRANTS AWARDED**

2022	<b>Rutgers core facility utilization</b> High-resolution imaging studies of high shear wet granulation processes PI: R. Ramachandran Amount: \$5,000
2022	<b>Boehringer Ingelheim</b> Mechanistic model development and analysis of bi-component wet granulation processes PI: R. Ramachandran Amount: \$80,000
2021	<b>Rutgers core facility utilization</b> Understanding the effect of key granule properties on granule microstructure PI: R. Ramachandran Amount: \$4,999
2020	<b>DOE / CESMII</b> Energy efficient smart manufacturing of pharmaceutical products PI: R. Ramachandran Co-PIs: B. Glasser, R. Singh, M. Ierapetritou (Uni. of Delaware) Amount: \$1,001,400
2019	<b>NIPTE / FDA</b> Comprehensive training program in continuous solid dose manufacturing PI: F. Muzzio Senior Personnel: R. Ramachandran Amount: \$486,000
2018	<b>NSF INTERN</b> Real-D: Smart Decision-Making using Data and Advanced Modeling Approaches. PI: R. Ramachandran Co-PIs: M. Ierapetritou (UD), S. Jha (ECE) Amount: \$55,000
2018	<b>NSF Eager</b> Real-D: Smart Decision-Making using Data and Advanced Modeling Approaches. PI: R. Ramachandran Co-PIs: M. Ierapetritou (UD), S. Jha (ECE) Amount: \$55,000
2018	<b>Food &amp; Drug Administration (FDA)</b> Advanced continuous upstream manufacturing of biotherapeutics PI: M. Ierapetritou Co-PIs: R. Ramachandran, R. Singh, H. Zhang, S. Chundawat, G. Tsilomelekis. Amount: \$1,800,000
2018	<b>Food &amp; Drug Administration (FDA)</b> Industry 4.0 Implementation in Continuous Pharmaceutical Manufacturing

PI: M. Ierapetritou  
 Co-PIs: R. Ramachandran, R. Singh, B. Glasser, F. Muzzio,  
 Amount: \$4,000,000  
 2018 **CNH Industrial**  
 Wear prediction and validation of fine particle material  
 PI: R. Ramachandran  
 Amount: \$118,000  
 2018 **DOE STTR Phase 2**  
 Fast fingerprinting and detecting of materials using portable NIR sensing  
 PI: V. Hanagadi  
 Rutgers PI: R. Ramachandran,  
 Co-PI: M. Ierapetritou, S. Jha  
 Amount: \$1,500,000 (Rutgers share: \$450,000)  
 2018 **Rutgers research council**  
 Manufacture of hollow-core granules for enhanced tablet dissolution for better patient healthcare.  
 PI: R. Ramachandran  
 Amount: \$4,800  
 2017 **NSF**  
 Intern DCL: Multiscale analysis of reactive granulation processes  
 PI: R. Ramachandran  
 Amount: \$50,000  
 2017 **Handok**  
 RTRT and sensing for drug product manufacturing  
 PI: R. Ramachandran  
 Amount: \$113,000  
 2017 **DOE STTR Phase 1**  
 Fast fingerprinting and detecting of materials using portable NIR sensing  
 PI: V. Hanagadi  
 Co- PI: R. Ramachandran, M. Ierapetritou, S. Jha  
 Amount: \$225,000  
 2016 **Bosch**  
 Process control in Pharmaceutical Manufacturing  
 PI: R. Ramachandran  
 Amount: \$7,500  
 2015 **Food & Drug Administration (FDA)**  
 Real-time release in continuous solid dose manufacturing: Systematic characterization of material properties and optimal design of sensing & control  
 PI: F. Muzzio  
 Co-PIs: R. Ramachandran, M. Ierapetritou, C. Wassgren, A. Cuitino, B. Glasser  
 Amount: \$4,000,000  
 2015 **NSF (AIR)**  
 Commercializing pharmaceutical process modeling for continuous manufacturing  
 PI: B. Glasser  
 Co-PIs: R. Dave, M. Ierapetritou, R. Mendez, C. Wassgren, Senior Personnel: R. Ramachandran  
 Amount: \$800,000  
 2015 **BASF**  
 Model based granulation design approach: Coupling of PBM with DEM  
 PI: R. Ramachandran  
 Co-PIs: B. Glasser  
 Amount: \$100,000  
 2015 **NSF Eager**  
 Cybermanufacturing: Advanced modeling and information management in pharmaceutical manufacturing  
 PI: M. Ierapetritou  
 Co-PIs: R. Ramachandran, S. Jha (ECE)  
 Amount: \$284,184  
 2015 **Janssen Pharmaceuticals**  
 Advanced Process understanding through continuous feed of data to empirical and multi-variate models  
 PI: M. Ierapetritou  
 Co-PIs: R. Ramachandran, S. Jha (ECE), F. Muzzio

Amount: \$115,000  
2015 **Rutgers research council**  
Understanding effects of formulation properties on heteroaggregates.  
PI: R. Ramachandran  
Amount: \$2,107

2015 **GSK**  
Integration of PAT and process models into a continuous manufacturing line  
PI: R. Ramachandran  
Co-PIs: F. Muzzio, M. Ierapetritou  
Amount: \$200,000

2015 **Bosch GmbH**  
Experimental comparison and characterization of three continuous granulation processes  
PI: R. Ramachandran  
Co-PIs: F. Muzzio  
Amount: \$47,500

2014 **Johnson & Johnson**  
J&J expansion of continuous pharmaceutical manufacturing  
PI: F. Muzzio  
Co-PIs: R. Ramachandran, B. Glasser, M. Ierapetritou, A. Cuitino  
Amount: \$3,500,000

2014 **Johnson & Johnson**  
Modeling, PAT and control development for Consigma/Tramacet  
PI: R. Ramachandran  
Co-PIs: F. Muzzio, M. Ierapetritou, A. Cuitino  
Amount: \$922,000

2014 **Speciality Chemical Company**  
Process modeling and validation of granulation behavior of mixed zirconia oxide powders  
PI: R. Ramachandran  
Amount: \$50,000

2014 **Rutgers Catalyst Consortium**  
Process design and sensing of continuous mulling processes  
PI: R. Ramachandran  
Amount: \$46,000

2014 **Food & Drug Administration (FDA)**  
Flowsheet modeling and analysis tools for solid base pharmaceutical products manufacturing  
PI: M. Ierapetritou  
Co-PIs: R. Ramachandran, F. Muzzio  
Award: \$500,000

2014 **Rutgers Research Council**  
Quantifying effect of material properties on granule  
PI: R. Ramachandran,  
Award: \$2,000

2014 **Process Systems Enterprise**  
Flowsheet modeling and database development of tablet manufacturing processes  
PI: M. Ierapetritou  
Co-PI: R. Ramachandran, F. Muzzio  
Award: \$70,000

2014 **BASF**  
Discrete element modeling of the Hosokawa micro nobilta mixer  
PI: B. Ramachandran  
Co-PI: B. Glasser  
Award: \$20,000

2014 **Johnson & Johnson**  
Discrete element modeling of NIR-probes bin blending processes  
PI: R. Ramachandran  
Co-PI: Ierapetritou.  
Award: \$50,000

2014 **Johnson & Johnson**  
Flowsheet modeling of Inspire tablet manufacturing line

PI: R. Ramachandran  
 Co-PI: Muzzio, Ierapetritou.  
 Amount: \$131,273  
 2014 **Johnson & Johnson**  
 Rutgers support for Continuation of Continuous Process Development Phase II  
 PI: F. Muzzio  
 Co-PI: Ramachandran, Cuitino, Ierapetritou.  
 Amount: \$488,683  
 2014 **Process Systems Enterprise**  
 Process modeling of particulate processes  
 PI: R. Ramachandran  
 Amount: \$34,908  
 2014 **FDA sponsored National Institute of Pharmaceutical Technology & Education**  
 Mechanistic modeling of fluid bed wet granulation processes for enhanced QbD of drug product development  
 PI: Ramachandran  
 Amount: \$104,000  
 2013 **National Science Foundation (NSF)**  
 CAREER: Multi-scale modelling and analysis of reactive granulation processes  
 PI: R. Ramachandran,  
 Award: \$412,000  
 2013 **Rutgers Research Council**  
 Quantitative analysis of the effect of granule properties on tablets  
 PI: R. Ramachandran,  
 Award: \$1,000  
 2013 **Speciality Chemical Company**  
 Quantitative analysis of the granulation of mixed-oxide zirconia powders  
 PI: R. Ramachandran  
 Co-PI: B. Glasser  
 Amount: \$30,000  
 2013 **Rutgers Catalyst Consortium**  
 Process design and sensing of continuous mulling processes  
 PI: R. Ramachandran  
 Amount: \$40,000  
 2013 **Syngenta, UK**  
 Mechanistic modeling of agitated dryers to understand agglomeration behavior  
 PI: R. Ramachandran  
 Amount: \$ 99,576  
 2012 **Czech-American S&T Cooperation – Program Kontakt II**  
 Multi-scale analysis and design of granulation processes  
 PI: F. Stepanek  
 Co-PI: R. Ramachandran  
 Amount: \$ 142,000  
 2012 **Rutgers Catalyst Consortium**  
 Process design and sensing of continuous mulling processes  
 PI: R. Ramachandran  
 Amount: \$40,000  
 2012 **FDA sponsored National Institute of Pharmaceutical Technology & Education**  
 Mechanistic modeling of high shear wet granulation processes for enhanced QbD of drug product development  
 PI: Ramachandran  
 Amount: \$55,000  
 2011 **Bristol-Myers Squibb (Late Phase Chemical Development)**  
 Multi-dimensional Modeling of Crystallization Processes  
 PI: R. Ramachandran  
 Award: \$16,000  
 2011 **Rutgers Faculty Research Grant Program**  
 Multi-scale modeling and validation of crystallization processes

- 2010 PI: R. Ramachandran,  
Award: \$12,500  
**Rutgers Research Council**  
Experimental Studies on Multi-component Wet Granulation  
PI: R. Ramachandran,  
Award: \$2,000
- 2010-2016 **NSF-ERC-SOPS**  
Process control and hardware integration of continuous tablet manufacturing  
PI / project leader: R. Ramachandran  
Award: \$700,000

## REFEREED JOURNAL PUBLICATIONS

- 125 Y. Chen, L. Kotamarthy, A. Dan, C. Sampat, P. Bhalode, R. Singh, B.J. Glasser, **R. Ramachandran**, M. Ierapetritou. Optimization of key energy and performance metrics for drug product manufacturing, *International Journal of Pharmaceutics*, 631, 122487-122504, 2023.
- 124 A. Dan, L. Kotamarthy, **R. Ramachandran**. Understanding the effect of process parameters and material properties on the breakage mechanisms and regimes of a milling process. *Chemical Engineering Research and Design*, 188, 607-619, 2022.
- 123 L. Kotamarthy, C. Sampat, **R. Ramachandran**. Development of a granule growth regime map for twin screw wet granulation process via data imputation techniques. *Pharmaceutics*, 14, 2211-2236, 2022.
- 122 S. Karkala, **R. Ramachandran**. Investigating the effects of material properties on the mixing dynamics of cohesive particles in a twin-screw mixer using a discrete element method approach. *Powder Technology*, 409, 117762-117777, 2022.
- 121 A.Zidan, L. Kotamarthy, **R. Ramachandran**, M. Ashraf, T.O. O'Connor. Optimization of screw design for continuous wet granulation: A case study for metoprolol succinate ER tablets. *International Journal of Pharmaceutics*, 623, 121964, 2022.
- 120 C. Sampat, L. Kotamarthy, P. Bhalode, Y. Chen, A. Dan, S. Parvani, Z. Dholakia, R. Singh, B.J. Glasser, M. Ierapetritou, **R. Ramachandran**. 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*, 1-20, 2022.
- 119 C. Sampat and **R. Ramachandran**. Risk assessment for a twin-screw granulation process using a supervised physics constrained auto-encoder and support vector machine framework. *Pharmaceutical Research*, 39, 2095-2107, 2022.
- 118 C. Sampat and **R. Ramachandran**. Physics-constrained autoencoder neural network for the prediction of key granule properties in a twin-screw granulation process. *Proceedings of the 14<sup>th</sup> International Symposium on Process Systems Engineering*, 1688-1692, 2022.
- 117 L. Kotamarthy, X. Feng, A. Alayoubi, P.K. Bolla, **R. Ramachandran**, M. Ashraf, T. O'Connor, A. Zidan. Switching from batch to continuous granulation: A case study of metoprolol succinate ER tablets. *International Journal of Pharmaceutics*, 617, 121598, 2022.
- 116 S.V. Muddu and **R. Ramachandran**. A population balance methodology incorporating semi-mechanistic residence metrics for twin screw granulation. *Processes*, 10(2), 1-21, 2022.
- 115 Y. Baranwal, A.D. Roman-Ospino, J. Li, S.M. Razavi, F.J. Muzzio, **R. Ramachandran**. Prediction of entire tablet formulations from pure powder components spectra via a two-step non-linear optimization technology. *International Journal of Pharmaceutics*, 615, 121474, 2022.
- 114 I. Muthancheri and **R. Ramachandran**. A hybrid model to predict formulation dependent granule growth in a bi-component wet granulation process. *Pharmaceutics*, 13(2), 1-20, 2021.
- 113 S. Gupta, Y. Baranwal, A.D Roman-Ospino, D. Hausner, **R. Ramachandran**, F.J. Muzzio. Performance Assessment of Linear Iterative Optimization (IOT) Algorithm for Raman Chemical Mapping of Pharmaceutical Tablets. *Journal of Pharmaceutical and Biomedical Analysis*, 205, 114305, 2021.
- 112 <sup>±3</sup>L. Kotamarthy and <sup>±1</sup>**R. Ramachandran**. Mechanistic understanding of the effects of process and design parameters on the mixing dynamics in continuous twin screw granulation. *Powder Technology*, 390, 73-85, 2021.
- 111 I. Muthancheri, S. Oka, **R. Ramachandran**. Analysis and prediction of nucleation mechanisms in a bi-component powder bed with wettability differentials. *Powder Technology*, 390, 209-218, 2021
- 110 C. Sampat, **R. Ramachandran**. Identification of Granule Growth Regimes in High Shear Wet Granulation Processes Using a Physics-Constrained Neural Network. *Processes*, 9(5), 737, 2021.
- 109 I. Muthancheri, A. Chaturbedi, A. Betard, **R. Ramachandran**. A compartment-based population balance model

- for the prediction of steady and induction granule growth behavior in high shear wet granulation. *Advanced Powder Technology*, 2021, Accepted.
- 108 V. Chopda, A. Gyrogyal, O. Yang, R. Singh, **R. Ramachandran**, H. Zhang, G. Tsilomelekis, S. Chundawat, M. Ierapetritou. Recent Advances in Integrated Process Analytical Techniques, Modeling, and Control Strategies to Enable Continuous Biomanufacturing of Monoclonal Antibodies. *Journal of Chemical Technology and Biotechnology*, 2021, Accepted.
- 107 A. Roman-Ospino, Y. Baranwal, J. Li, J. Vargas, B. Igne, S. Bate, D. Brouckaert, F. Chauchard, D. Hausner, **R. Ramachandran**, R. Singh, F. Muzzio. 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, 120594-120605, 2021.
- 106 S. Muddu, L. Kotamarthy, **R. Ramachandran**. A semi-mechanistic prediction of residence time metrics in twin screw granulation. *Pharmaceutics*, 13(3), 393-412, 2021.
- 105 K. M. Moroney, L. Kotamarthy, I. Muthancheri, **R. Ramachandran**, M. Vynnycky. A moving boundary model of dissolution from binary drug-excipient granules incorporating granule microstructure. *International Journal of Pharmaceutics*, 599, 120219-120233, 2021.
- 104 N. Metta, **R. Ramachandran**, M. Ierapetritou. A novel adaptive sampling based methodology for feasible region identification of compute intensive models using artificial neural network. *AIChE Journal*, 67(2), e17095, 2020.
- 103 A. Chaturbedi, S. Patil, **R. Ramachandran**, N.C. Shapley. Adsorption of positively and negatively charged heavy metal ions from wastewater by heteroaggregates of biopolymer particles. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 602, 124789, 2020.
- 102 Y. Chen, O. Yang, C. Sampat, P. Bhalode, R. Ramachandran, M. Ierapetritou. Digital twins in pharmaceutical and biopharmaceutical manufacturing: A Literature Review. *Processes*, 8(9), 1088, 2020.
- 101 L. Kotamarthy, N. Metta, **R. Ramachandran**. Understanding the effect of granulation and milling process parameters on the quality attributes of milled granules. *Processes* 2020, 8(6), 683.
- 100 I. Muthancheri, B. Long, K.M. Ryan, L. Padrela, **R. Ramachandran**. Development and Validation of a Two-dimensional Population Balance Model for a Supercritical CO<sub>2</sub> Anti-Solvent Batch Crystallization Process. *Advanced Powder Technology* (Accepted June 2020)
- 99 C. Sampat, Y. Baranwal, **R. Ramachandran**. Accelerating multi-dimensional population balance model simulations via a highly scalable framework using GPUs. *Computers and Chemical Engineering* (Accepted May 2020).
- 98 I. Muthancheri, **R. Ramachandran**. Mechanistic understanding of granule growth behavior in bi-component wet granulation processes with wettability differentials. *Powder Technology*. 367, 841-859, 2020
- 97 A. Chaturbedi, S. Patil, **R. Ramachandran**, N. Shapley. Adsorption of positively and negatively charged heavy metal ions from wastewater by heteroaggregates of biopolymer particles. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*. 124789, May 2020
- 96 K. Moroney, P. Cronin, O. Adeleye, B. Schaller, B. Castro-Dominguez, **R. Ramachandran**, G. Walker. An evaluation of the Johanson model for roller compaction process development for a high dose API. *Powder Technology*, 366, 82-95, 2020.
- 95 T. Gao, A. Singaravelu, S. Oka, **R. Ramachandran**, F. Stepanek, N. Chawla, H. N. Emady. Powder Bed Packing and API Content Homogeneity of Granules in Single Drop Granule Formation. *Powder Technology*, 366, 12-21, 2020.
- 94 A. Tamrakar, A. Zheng, P. Piccione, **R. Ramachandran**. Investigating particle-level dynamics to understand bulk behaviour in a lab-scale agitated filter dryer (AFD) using discrete element analysis (DEM). *Advanced Powder Technology*, 31 (1), 477-492, 2020.
- 93 A. Román-Ospino, A. Tamrakar, B. Igne, E. Dimaso, C. Airiau, D. Clancy, G. Pereira, F. Muzzio, R. Singh, **R. Ramachandran**. Characterization of NIR interfaces for the feeding and in-line monitoring of a continuous granulation process. *International Journal of Pharmaceutics and Biopharmaceutics* 574, 118848, 2020.
- 92 W. Meng, J. Dvorak, R. Kumar, R. Hofmeister, F. Stepanek, **R. Ramachandran**, F.J. Muzzio. Continuous high-shear granulation: mechanistic understanding of the influence of process parameters on critical quality attributes via elucidating the internal physical and chemical microstructure. *Advanced Powder Technology*, 30(9), 1765-1781, 2019.
- 91 Y. Baranwal, A.D. Roman-Ospino, G. Kevyan, J.M. Ha, E.P Hong, F.J. Muzzio, **R. Ramachandran**. Prediction of dissolution profiles by non-destructive NIR spectroscopy in bilayer tablets. *International Journal of Pharmaceutics*, 565, 419-436, 2019.
- 90 S. Karkala, N. Davis, C. Wassgren, Y. Shi, X. Liu, C. Riemann, G. Yacobian, **R. Ramachandran**. Calibration of Discrete Element Method Parameters for Cohesive Materials using Dynamic Yield Strength and Shear Cell Experiments. *Processes*, 278, 1-16, 2019.
- 89 N. Metta, M. Ghijs, E. Schafer, A. Kumar, P. Cappuyns, I. Van Assche, R. Singh, **R. Ramachandran**, T. De Beer, M. Ierapetritou, I. Nopens. Dynamic flowsheet model development and sensitivity analyses of a continuous

- pharmaceutical tablet manufacturing process using the wet granulation route. *Processes*, 7(4), 1-35, 2019.
- 88 N. Metta, **R. Ramachandran**, M. Ierapetritou. A computationally efficient surrogate based reduction of a multi-scale comill model. *Journal of Pharmaceutical Innovation*, Accepted, 2019.
- 87 W. Meng, A. Román-Ospino, S. Panikar, C. O'Callaghan, S. Gilliam, **R. Ramachandran**, F. Muzzio. Advanced process design and understanding of continuous twin-screw granulation via implementation of in-line process analytical technologies. *Advanced Powder Technology*, 30(4), 879-894, 2019.
- 86 A. Tamrakar, D. Reddy, **R. Ramachandran**. CFD-DEM-PBM Coupled Model Development and Validation of a 3D Top-spray Fluidized Bed Wet Granulation Process. *Computers and Chemical Engineering*, 41, 159-187, 2019.
- 85 A. Tamrakar, S. Chen, **R. Ramachandran**. A DEM model based study to quantitatively compare the effect of wet and dry binder addition in high shear wet granulation processes, *Chemical Engineering Research and Design*, 142, 307-326, 2019.
- 84 W. Meng, K. S. Rao, R.D. Snee, **R. Ramachandran**, F. Muzzio. A comprehensive analysis and optimization of continuous twin-screw granulation processes via sequential experimentation strategy. *International Journal of Pharmaceutics*, 556, 349-362, 2019.
- 83 T. Gao, A. Singaravelu, S. Oka, **R. Ramachandran**, F. Stepanek, N. Chawla, H.N. Emady. Granule Formation and Structure from Single Drop Impact on Heterogeneous Powder Beds. *International Journal of Pharmaceutics* (Accepted 2018)
- 82 G. Pereira, S. Muddu, A. Roman, D. Clancy, B. Igne, C. Airiau, F. Muzzio, M. Ierapetritou, **R. Ramachandran**, R. Singh. Combined Feedforward/Feedback Control of an Integrated Continuous Granulation Process. *Journal of Pharmaceutical Innovation*, 5, 1-27, 2018.
- 81 S. Muddu, A. Tamrakar, P. Pandey, **R. Ramachandran**. Model Development and Validation of Fluid Bed Wet Granulation with Dry Binder Addition using a Population Balance Model Methodology. *Processes*, 6(9), 154, 2018)
- 80 C. Sampat, F. Bettencourt Y. Baranwal, I. Paraskevagos, A. Chaturbedi, S. Karkala, S. Jha, **R. Ramachandran**, M. Ierapetritou, A parallel unidirectional coupled DEM-PBM model for the efficient simulation of computationally intensive particulate process systems. *Computers and Chemical Engineering*, 119, 128-142, 2018
- 79 N. Metta, M. verstraten, M. Ghijs, A. Kumar, E. Schaefer, R. Singh, T. De Beer, I. Nopens, P. Cappuyens, I. Van Asche, M. Ierapetritou, **R. Ramachandran**. 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*. Accepted 2018
- 78 A. Chaturbedi, P. Pandey, D. Bindra, J.P. Reddy, B. Lang, D. Buckley, **R. Ramachandran**. Predictive population balance model development and validation of the effect of HSWG process parameters on granule properties, *Powder Technology*, 338, 391-401, 2018
- 77 H. Cao, S. Mushnoori, B. Higgins, C. Kollipara, A. Fermier, D. Hausner, S. Jha, R. Singh, M. Ierapetritou and **R. Ramachandran**. A Systematic Framework for Data Management and Integration in a Continuous Pharmaceutical Manufacturing Processing Line. *Process*, 6(5), 53, 2018.
- 76 A. Kataria, S. Oka, D. Smrcka, Z. Grof, F. Stepanek, **R. Ramachandran**. " A quantitative analysis of drug migration during granule drying " *Chemical Engineering Research and Design*, 136, 199-206, 2018.
- 75 N. Metta, M. Ierapetritou, **R. Ramachandran**. A multiscale DEM-PBM approach for a continuous comilling process using a mechanistically developed breakage kernel. *Chemical Engineering Science*, Accepted.
- 74 S. Oka, D. Smrcka, A. Kataria, H. Emady, F. Muzzio, F. Stepanek, **R. Ramachandran**. Analysis of the origins of content non-uniformity in high-shear wet granulation. *International Journal of Pharmaceutics*, 528, 1-2, 578-585, 2017.
- 73 W. Meng, S. Oka, X. Liu, T. Omar, **R. Ramachandran**, F. Muzzio. Effects of process and design parameters on granule size distribution in a continuous high shear granulation process. *Journal of Pharmaceutical Innovation*, 12-4, 283-295, 2017..
- 72 M. Sen, S. Karkala, S. Panikar, O. Lyngberg, M. Johnson, A. Marchut, E. Schaefer, **R. Ramachandran**. Analyzing the Mixing Dynamics of an Industrial Batch Bin Blender via Discrete Element Modeling Method, *Processes*, 5(2), 22, 2017.
- 71 A. Chaturbedi, C. Bandi, D. Reddy, P. Pandey, A. Narang, D. Bindra, L. Tao, J. Zhao, J. Li, M. Hussain, **R. Ramachandran**. Compartment Based Population Balance Model Development of a High Shear Wet Granulation Process via Dry and Wet Binder Addition. *Chemical Engineering Research & Design*, 123, 187-200, 2017.
- 70 F. Bettencourt, A. Chaturbedi, **R. Ramachandran**. Parallelization methods for efficient simulation of high dimensional population balance models of granulation. *Computers & Chemical Engineering*, 107, 150-170, 2017
- 69 W. Meng, L. Kotamarthy, S. Panikar, M. Sen, S. Pradhan, M. Marc, J. Lister, F. Muzzio, **R. Ramachandran**. Statistical analysis and comparison of a continuous high shear granulator with a twin screw granulator: effect of process parameters on critical quality attributes and granule mechanisms. *International journal of pharmaceutics*, 513, 357-375, 2016.
- 68 A. Tamrakar, A. Gunadi, P. Piccione, **R. Ramachandran**. Dynamic agglomeration profile during the drying



- phase in an agitated filter dryer: parametric investigation and regime map studies. *Powder Technology*, 303, 109-123, 2016.
- 67 A.Roman, R. Singh, C. Zuniga, R. Mendez, **R. Ramachandran**, M. Ierapetritou, F. Muzzio, R. Romanach. Near Infrared spectroscopic calibration models for real time monitoring of powder density, *International journal of pharmaceuticals*, 52, 61-74, 2016.
- 66 A.Chaturedi, C. Pathak, K. Deshpande, N. Shapley, **R. Ramachandran**. Population balance model development and experimental validation of the heteroaggregation of oppositely charged micro and nano particles. *Chemical Engineering research and design*, 113, 96-111, 2016.
- 65 M.O. Besenhard, S. Karkala, E. Faulhammer, S. Fathollahi, **R. Ramachandran**, J.G Khinast. Continuous feeding of low dose APIs via periodic micro dosing, *International Journal of Pharmaceutics*, 509, 123-134, 2016.
- 64 S. Wu, S. Panikar, J. Zhang, R. Singh, B. Glasser, **R. Ramachandran**. A systematic framework to monitor mulling processes using Near Infrared spectroscopy. *Advanced Powder Technology*, 27, 1115-1127, 2016
- 63 M. Adepu, S. Hate, A. Betard, S. Oka, M. Schongut, Y. Sood, F. Stepanek, F. Muzzio, D. Wolf, S. Wieland, B. Glasser, **R. Ramachandran**. Quantitative validation of the regime map approach for the wet granulation of industrially relevant zirconium hydroxide powders. *Powder Technology*, vol, 177-184, 2016.
- 62 D. Barrasso and **\*R. Ramachandran**. Qualitative assessment of a multi-scale, compartmental PBM-DEM model of a continuous twin-screw wet granulation process. *Journal of Pharmaceutical Innovation*, 1-19, 2015.
- 61 R. Singh, A. Roman, R. Romanach, M. Ierapetritou, **\*R. Ramachandran**. Real time monitoring of blend density for coupled feed-forward/feed-back control of a continuous direct compaction tablet manufacturing process. *International Journal of Pharmaceutics*, 495 (1), 612-625, 2015.
- 60 R. Singh, F. Muzzio, M. Ierapetritou, **\*R. Ramachandran**. A combined feed-forward/feed-back control system for a QbD based continuous tablet manufacturing process. *Processes*, 3 (2), 339-356, 2015.
- 59 R. Singh, F.J. Muzzio, M.G. Ierapetritou, **\*R. Ramachandran**. Plant-wide control of a continuous tablet manufacturing process for Quality-by-Design based pharmaceutical manufacturing. *Computer Aided Chemical Engineering*, 37, 2177-2182, 2015.
- 58 R. Singh, M. Sen, M. Ierapetritou, **\*R. Ramachandran**. Integrated moving horizon based real time optimization and hybrid MPC-PID control of a direct compaction continuous tablet manufacturing process. *Journal of Pharmaceutical Innovation*, 1-21, 2015.
- 57 D. Barrasso, A. Tamrakar, **\*R. Ramachandran**. Model order reduction of a multi-scale PBM-DEM description of a wet granulation process via ANN. *Procedia Engineering*, 102, 1295-1304, 2015.
- 56 S. Oka, H. Emady, O. Kaspar, V. Tokarova, F. Muzzio, F. Stepanek, **\*R. Ramachandran**. The effects of improper mixing and preferential mixing of active and excipient ingredients on content uniformity in high shear wet granulation. *Powder Technology*, 278, 266-277, 2015.
- 55 A. Chaudhury, A. Tamrakar, M. Schongut, D. Smrcka, F. Stepanek, **\*R. Ramachandran**. Multi-dimensional population balance model development and validation of reactive granulation processes. *Industrial & Engineering Chemistry Research*, 54(3), 842-857, 2014.
- 54 D. Barrasso, T. Eppinger, F. Perera, R. Aglave, K. Debus, S. Bermingham, **\*R. Ramachandran**. A multi-scale, mechanistic model of a wet granulation process using a novel bi-directional PBM-DEM coupling algorithm. *Chemical Engineering Science*, 123, 500-513 2015.
- 53 A. Chaudhury, M. Armenante and **\*R. Ramachandran**. Compartment based population balance modeling of a high shear wet granulation process using data analytics. *Chemical Engineering Research & Design*, 95, 211-228, 2015.
- 52 S. Oka, O. Kaspar, V. Tokarova, K. Sowrirajan, H. Wu, M. Khan, F. Muzzio, F. Stepanek, **\*R. Ramachandran**. A quantitative study of the effect of process parameters on key granule characteristics in a high shear wet granulation process wet granulation process involving a two component pharmaceutical blend. *Advanced Powder Technology*, 26(1), 315-322, 2015.
- 51 M. Sen, A. Chaudhury. R. Singh, **\*R. Ramachandran**. Two-dimensional population balance development and validation of a pharmaceutical crystallization process. *American Journal of Modern Chemical Engineering*, 1 13-29, 2014.
- 50 J. Zhang, Y. Ying, B. Pielecha-Safira, E. Bilgili, **R. Ramachandran**, R. Rodolfo, R. Dave, Z. Iqbal. Raman spectroscopy for in-line and off-line quantification of poorly soluble drugs in strip films. *International Journal of Pharmaceutics*, 475(1-2), 428-437, 2014.
- 49 D. Barrasso, A. Tamrakar, **\*R. Ramachandran**. A reduced order PBM-ANN model of a multi-scale PBM-DEM description of a wet granulation process. *Chemical Engineering Science*, 119, 319-329, 2014.
- 48 M.O. Besenhard, A. Chaudhury, T. Vetter, **R. Ramachandran**, J. Khinast. Evaluation of parameter estimation methods for crystallization processes modeled via population balance equations. *Chemical Engineering Research & Design*, 94, 275-289, 2014.
- 47 D. Barrasso, A. El Hagrasy, J.D. Litster, **\*R. Ramachandran**. Multi-dimensional population balance model development and validation for a twin screw granulation process, *Powder Technology*, 270B, 612-621, 2015.

- 46 R. Singh, A. Sahay, K.M. Karry, F. Muzzio, M. Ierapetritou, \***R. Ramachandran**. Implementation of an advanced hybrid MPC-PID control system using PAT tools into a direct compaction continuous pharmaceutical tablet manufacturing pilot plant. *International Journal of Pharmaceutics*, 473, (1-2), 38-54, 2014.
- 45 M. Ghodbane, A. Kulesa, H.H. Yu, T.J. Maguire, R.R. Schloss, **R. Ramachandran**, J.D. Zahn, and M.L. Yarmush, "Development of a Low Volume, Highly Sensitive Microimmunoassay using Computational Fluid Dynamics Driven Multi-Objective Optimization", *Microfluidics and Nanofluidics*, 18(2), 199-214, 2014.
- 44 M. Sen, R. Singh, \***R. Ramachandran**. A hybrid MPC-PID control system design for the continuous purification and processing of active pharmaceutical ingredients, *Processes*, 2 (2), 392-418, 2014
- 43 D. Barrasso, \***R. Ramachandran**. Multi-scale modeling of granulation processes: bi-directional coupling of PBM with DEM via collision frequencies. *Chemical Engineering Research & Design*, 93, 304-317, 2015.
- 42 R. Singh, A. Sahay, F.J. Muzzio, M.G. Ierapetritou, \***R. Ramachandran**. A systematic framework for onsite design and implementation of a control system in a continuous tablet manufacturing process. *Computers & Chemical Engineering*, 66, 186-200, 2014.
- 41 M. Sen, D. Barrasso, R. Singh, \***R. Ramachandran**. A Multi-scale Hybrid CFD-DEM-PBM Description of a Fluid-bed Granulation Process. *Processes*, 2(1), 89-111, 2014.
- 40 M. Sen, R. Singh, \***R. Ramachandran**. Simulation based design of an efficient control system for the continuous purification and processing of active pharmaceutical ingredients, *Journal of Pharmaceutical Innovation*, 9(1), 16-37, 2014
- 39 A. Chaudhury, D. Barrasso, P. Pandey, H. Wu, \***R. Ramachandran**. Population balance model development, validation, and prediction of CQAs of a high-shear wet granulation process: Towards QbD in Drug Product Pharmaceutical Manufacturing. *Journal of Pharmaceutical Innovation*, 9(1), 53-64, 2014.
- 38 R. Singh, D. Barrasso, A. Chaudhury, M. Sen, M. Ierapetritou, \***R. Ramachandran**. Closed-loop feedback control of a continuous pharmaceutical tablet manufacturing process via wet granulation. *Journal of Pharmaceutical Innovation*, 9(1), 16-37, 2014.
- 37 A. Chaudhury, H. Wu, M. Khan, \***R. Ramachandran**, A mechanistic population balance model for granulation processes: Effect of process and formulation parameters, *Chemical Engineering Science*, 107, 76-92, 2014.
- 36 A. Chaudhury, I. Oseledets, \***R. Ramachandran**, A computationally efficient technique for the solution of multi-dimensional PBMs of granulation via tensor decomposition, *Computers & Chemical Engineering*, 61, 234- 244, 2014
- 35 O. Kaspar, V. Tokarova, S. Oka, K. Sowrirajan, **R. Ramachandran**, F. Stepanek, Combined UV/vis and microtomography investigation of acetaminophen dissolution from granules, *International Journal of Pharmaceutics*, 458, 272-281, 2013
- 34 M. Sen, A. Rogers, R. Singh, A. Chaudhury, J. John, M. Ierapetritou and \***R. Ramachandran**. Flowsheet modeling and optimization of an integrated pharmaceutical purification-processing manufacturing operation. *Chemical Engineering Science*, 102, 56-66, 2013
- 33 D. Barrasso, S. Oka, A. Muliadi, J.D. Litster, C. Wassgren and \***R. Ramachandran**. Population balance model validation and prediction of CQAs for continuous milling processes: toward QbD in pharmaceutical drug product manufacturing. *Journal of Pharmaceutical Innovation*, 8(3), 147-162, 2013.
- 32 D. Barrasso, S. Walia and \***R. Ramachandran**. Multi-component population balance modeling of continuous granulation processes: a parametric study and comparison with experimental trends. *Powder Technology*, 241, 85-97, 2013.
- 31 R. Singh, M. Ierapetritou and \***R. Ramachandran**. System-wide hybrid MPC-PID control of a continuous pharmaceutical tablet manufacturing process via direct compaction. *European Journal of Pharmaceutics & Biopharmaceutics*, 85, 1164-1182, 2013.
- 30 A.V. Prakash, A. Chaudhury and \***R. Ramachandran**. Parallel simulation of population balance model-based particulate processes using multi-core CPUs and GPUs. *Modelling and Simulation*, 1-16, 2013.
- 29 A.V. Prakash, A. Chaudhury, D. Barrasso and \***R. Ramachandran**. Simulation of population balance model-based particulate processes via parallel and distributed computing. *Chemical Engineering Research & Design*, 91 (7), 2013.
- 28 M. Sen, A. Chaudhury, J. John, R. Singh, \***R. Ramachandran**. Multi-scale flowsheet simulation of an integrated continuous purification-downstream pharmaceutical manufacturing process. *International Journal of Pharmaceutics*, 445 (1-2), 29-38, 2013.
- 27 A. Chaudhury, A. Kapadia, D. Barrasso, A.V. Prakash and \***R. Ramachandran**. An Extended Cell-average Technique for Multi-Dimensional Population Balance Models describing Aggregation and Breakage. *Advanced Powder Technology*, 24 (6), 962-971, 2013.
- 26 A. Chaudhury and \***R. Ramachandran**. Integrated population balance model development and validation of a granulation process. *Particulate Science & Technology*, 31(4), 407-418, 2013.
- 25 R. Singh, M. Ierapetritou, \***R. Ramachandran**. Hybrid advanced control of flexible multipurpose continuous tablet manufacturing process via direct compaction, *Computer Aided Chemical Engineering*, 32, 757-762, 2013.

- 24 M. Sen, A. Dubey, R. Singh, \***R. Ramachandran**. Hybrid PBM-DEM simulation and validation of a continuous mixing process. *Journal of Powder Technology*, 2013, 1-11, 2013.
- 23 F. Boukouvala, A. Chaudhury, M. Sen, R. Zhou, L. Mideskowski, M. Ierapetritou and \***R. Ramachandran**. Computer-Aided Flowsheet Simulation of a Continuous Tablet Manufacturing Process incorporating Wet Granulation, *Journal of Pharmaceutical Innovation*, 8 (1), 11-27, 2013.
- 22 R. Singh, M. Ierapetritou and \***R. Ramachandran**. An engineering study on the enhanced control and operation of continuous manufacturing of pharmaceutical tablets via roller compaction. *International Journal of Pharmaceutics*, 307-326, 438, 2012.
- 21 D. Barrasso and \***R. Ramachandran**. A comparison of model order reduction techniques for a four-dimensional population balance model describing multi-component wet granulation processes. *Chemical Engineering Science*, 80, 380-392, 2012.
- 20 M. Sen, R. Singh, A. Vanarase, J. John and \***R. Ramachandran**. Multi-dimensional population balance modeling and experimental validation of continuous powder mixing processes. *Chemical Engineering Science*, 80, 349-360, 2012.
- 19 P. Pandey, J. Tao, A. Chaudhury, **R. Ramachandran**, J.Z. Gao, D. Bindra. A combined experimental and modeling approach to study the effects of high-shear wet granulation process parameters on granule characteristics. *Pharmaceutical Development & Technology*, 18, 210-224, 2012.
- 18 A. Chaudhury, A. Niziolek and \***R. Ramachandran**. Multi-dimensional mechanistic modeling of fluid-bed granulation processes: an integrated approach. *Advanced Powder Technology*, 113-131, 24, 2013.
- 17 F. Boukouvala, V. Niotis, **R. Ramachandran**, F. J. Muzzio and M. I. Ierapetritou. An integrated approach to dynamic flowsheet modeling of a continuous tablet manufacturing process. *Computers & Chemical Engineering*, 42, 30-47, 2012.
- 16 M. Sen and \***R. Ramachandran**. A Multi-dimensional Population Balance Model Approach to Continuous Powder Mixing Processes. *Advanced Powder Technology*, 51-59, 24, 2013.
- 15 \***R. Ramachandran**, M. Ansari, A. Chaudhury, A. Kapadia, A. V. Prakash and F. Stepanek. A quantitative assessment of the influence of primary particle size distribution on granule inhomogeneity. *Chemical Engineering Science*, 104-110, 71, 2012.
- 14 \***R. Ramachandran** and A. Chaudhury. Model-based Design and Control of Continuous Drum Granulation Processes. *Chemical Engineering Research & Design*, 90, 1063-1073, 2012.
- 13 \***R. Ramachandran**, J. Arjunan, A. Chaudhury and M. Ierapetritou. Model-based control-loop performance assessment of a continuous direct compaction pharmaceutical process. *Journal of Pharmaceutical Innovation*, 6, 249-263, 2011.
- 12 F. Boukouvala, A. Dubey, A. Vanarase, **R. Ramachandran**, F.J. Muzzio and M.I. Ierapetritou. Computational approaches for studying the granular dynamics of continuous blending processes: Population Balance and Data based methods. *Macromolecular Materials and Engineering*, 296, 9-19, 2012.
- 11 F. Boukouvala, **R. Ramachandran**, A. Vanarase, F.J. Muzzio and M.G. Ierapetritou. Computer Aided Design and Analysis of Continuous Pharmaceutical Manufacturing Processes. *Computer Aided Chemical Engineering*, 29, 216-220, 2011.
- 10 \***R. Ramachandran**. A multi-scale approach to granulation process design. *Computer Aided Chemical Engineering*, 29, 91-95, 2011.

### Pre – Rutgers publications

- 9 S. Schaber, D. Gerogiorgis, **R. Ramachandran**, J.M.B. Evans, P.I. Barton and B.L. Trout. Economic Analysis of Integrated Continuous and Batch Pharmaceutical Manufacturing: A Case Study. *Industrial Engineering Research & Chemistry*, 50, 10083-10092, 2011.
- 8 **R. Ramachandran** and P. I. Barton. Effective parameter estimation within a multi-dimensional population balance framework. *Chemical Engineering Science*, 65, 5884-5893, 2010.
- 7 **R. Ramachandran**, C.D. Immanuel, F. Stepanek, J.D. Litster and F.J. Doyle III. A Mechanistic Model for Granule Breakage in Population Balances of Granulation: theoretical kernel development and experimental validation. *Chemical Engineering Research and Design*, 87, 598-614, 2009.
- 6 T. Glaser, C.F.W. Sanders, F.Y. Wang, I.T. Cameron, J.D. Litster, J. Poon, **R. Ramachandran**, C.D. Immanuel, F.J. Doyle III. Model Predictive Control of Continuous Drum Granulation. *Journal of Process Control*, 19, 615-622, 2009.
- 5 F. Stepanek, P. Rajniak, R. Chern, C. Mancinelli and **R. Ramachandran**. Distribution and accessibility of binder in wet granules. *Powder Technology*, 189, 376-384, 2009.
- 4 J. Poon, **R. Ramachandran**, C. Sanders, T. Glaser, C.D. Immanuel, F.J. Doyle III, J.D. Litster, F. Stepanek, F.Y. Wang and I.T. Cameron. Experimental Validation Studies on a Multi-Dimensional and Multi-Scale Population Balance Model of Batch Granulation. *Chemical Engineering Science*, 64, 775-786, 2009.
- 3 **R. Ramachandran**, J. Poon, C.F.W. Sanders, T. Glaser, C.D. Immanuel, F.J. Doyle III, J.D. Litster, F. Stepanek,

F.Y. Wang and I.T. Cameron. Experimental Studies on Distributions of Granule Size, Binder Content and Porosity in Batch Drum Granulation: Inferences on process modelling requirements and process sensitivities. *Powder Technology*, 188, 89-101, 2008

2 **R. Ramachandran**, S. Lakshminarayanan and G.P. Rangaiah. Data Analysis, Modelling and Control Performance Enhancement of an Industrial Fluid Catalytic Cracking Unit. *Chemical Engineering Science*, 62, 1958-1973, 2007.

1 **R. Ramachandran**, S. Lakshminarayanan and G.P. Rangaiah. Process Identification using Open-Loop and Closed-Loop Step Responses. *Journal of the Institute of Engineers Singapore*, 45 (6), 1-13, 2005.

### **INVITED SHORT PAPERS**

7 **R. Ramachandran**. Understanding the effect of formulation and process parameters on granule dissolution. *Recent patents on drug delivery and formulation*, Accepted, 2015.

6 M. Sen, R. Singh, **R. Ramachandran**. Model Manufacturing. *The Medicine Maker*, 5, 42-45, 2015.

5 R. Singh, M. Ierapetritou, **R. Ramachandran**. The scope of PAT in real-time advanced control of tablet quality. *European Pharmaceutical Review* 20 (2), 76-80, 2015.

4 M.S. Escotet-Espinoza, R. Singh, M. Sen, T. O'Connor, S. Lee, S. Chatterjee, **R. Ramachandran**, M. Ierapetritou, F. J. Muzzio. Flowsheet Models Modernize Pharmaceutical Manufacturing Design and Risk Assessment. *Pharmaceutical Technology*, 39 (4), 34-42, 2015.

3 R. Singh, F. Boukouvala, E. Jayjock, **R. Ramachandran**, M. Ierapetritou, F.J. Muzzio. Flexible multipurpose continuous processing of a pharmaceutical tablet manufacturing process. *European Compliance Academy*. 2012.

2 R. Singh, F. Boukouvala, E. Jayjock, **R. Ramachandran**, M. Ierapetritou, F.J. Muzzio. Flexible multipurpose continuous processing. *PharmPro*. 2012.

1 Singh, R., Sahay, A., Oka, S., Liu, X., **Ramachandran, R.**, Ierapetritou, M., Muzzio, F. Online monitoring, advanced control and operation of robust continuous pharmaceutical tablet manufacturing process. *BioPharma magazine Asia*. 2, 2013.

### **CHAPTERS IN BOOKS**

9 S. Muddu and **R. Ramachandran**. A modeling, control, sensing and experimental overview of continuous wet granulation. How to design and implement powder to tablet continuous manufacturing systems. Elsevier, 2022.

8 A.S. Narang, L. Tao, J. Zhao, R. Keluskar, S. Gour, T. Stevens, K. Mascias, B. Remy, P. Pandey, R.D. LaRoche, A. Sosnowska, S. Cole, A. Dubey, **R. Ramachandran**, J. Li, D. Bindra. Effect of binder addition on granule growth and densification. *Handbook of Pharmaceutical Wet Granulation, Theory and Practice in a Quality by Design Paradigm*, Elsevier, 351-381, 2019.

7 A. Tamrakar, D.R. Devarampally, **R. Ramachandran**. Advanced multiphase hybrid model development of fluidized bed wet granulation processes. *Process systems engineering for pharmaceutical manufacturing*, Elsevier, 2018.

6 **R. Ramachandran**. Enhanced process design and control of a multiple-input multiple-output granulation process. *Comprehensive QbD for pharmaceutical product development and manufacture*, AIChE, Wiley, 2017.

5 A. Chaudhury, D. Barrasso, D. Pohlman, J.D. Litster, **R. Ramachandran**. Mechanistic modeling of high shear and twin screw mixer granulation processes. *Handbook in Process Modeling in Pharmaceutical Industry*, Elsevier, 2016.

4 D. Barrasso, **R. Ramachandran**. Discrete element modeling of solid dosage manufacturing processes. *Handbook in Process Simulation and Data Modeling in Solid Oral Drug Development and Manufacture*, Humana Press, 2016.

3 A. Chaudhury, M. Sen, D. Barrasso, **R. Ramachandran**. Population balance models for pharmaceutical processes. *Handbook in Process Simulation and Data Modeling in Solid Oral Drug Development and Manufacture*, Humana Press, 2016.

2 R. Singh, C. Velazquez, A. Sahay, K. Karry, F. Muzzio, M. Ierapetritou, **R. Ramachandran**. Advanced Control of Continuous Pharmaceutical Tablet Manufacturing Processes. *Handbook in Process Simulation and Data Modeling in Solid Oral Drug Development and Manufacture*, Humana Press, 2016.

1 **R. Ramachandran**, J. Poon, F.J. Doyle III, J.D. Litster, F. Stepanek and C.D. Immanuel. A Mechanistic Model for the Nucleation and Aggregation Phenomena in Population Balances of Granulation. *Modelling and Simulation*, Allied M/S Publishers, 2007.

### **BOOKS EDITED**

- 2 A.Fytopoulos, **R. Ramachandran**, P.M. Pardalos. Optimization of Pharmaceutical Processes. Springer Optimization and its Application, Springer, 189, 2022.
- 1 M. Ierapetritou and **R. Ramachandran**. Process simulation and data modeling in solid oral drug development and manufacture. Methods in Pharmacology and Toxicology, Humana Press, 2016.

## REFEREED CONFERENCE PROCEEDINGS

- 22 A.Dan, H. Vaswani, A. Grzabka-Zasadzinska, J. Li, K. Sen, S. Paul, Y. Chao, R. Ramachandran. Quantitative analysis of the effects of multi-component formulation variations on granule properties. 10<sup>th</sup> International Granulation workshop, Sheffield, UK, 2023.
- 21 I. Muthancheri, **R. Ramachandran**. Mechanistic understanding of hydrophobicity on bi-component high shear wet granulation growth. 9<sup>th</sup> International Granulation workshop, Lausanne, Switzerland, 2019.
- 20 T. Gao, A.S.S. Singaravelu, S. Oka, **R. Ramachandran**, F. Stepanek, N. Chawla, H.N. Emady. Powder bed packing and API content homogeneity of granules in single drop granule formation. 9<sup>th</sup> International Granulation workshop, Lausanne, Switzerland, 2019.
- 19 S. Muddu, **R. Ramachandran**. A combined PBM-RTD model for continuous 2-component wet granulation. 8<sup>th</sup> World congress particle technology (WCPT8), Orlando, Florida, 2018.
- 18 A. Kataria, S. Oka, D. Smrcka, Z. Grof, F. Stepanek, F. Muzzio, **R. Ramachandran**. A quantitative analysis of drug migration during granule drying. 8<sup>th</sup> International Granulation workshop, Sheffield, UK, 2017.
- 17 A. Tamrakar, S. Karkala, D. Schenkel, **R. Ramachandran**. Implementation of hybrid DEM-PBM approach to reduce the computational cost of powder mixing modeling. 26<sup>th</sup> European symposium on computer aided process engineering, Portoroz, Slovenia, 2015.
- 16 R. Sayin, D. Barrasso, J. Osorio, **R. Ramachandran** and J.D. Litster. Population balance modeling of twin screw granulation through mechanistic understanding. 7<sup>th</sup> International Granulation workshop, Sheffield, UK, 2015.
- 15 A. Tamrakar, D. Barrasso, C. Cruz and **R. Ramachandran**. Multi-scale modeling of fluid bed granulation processes through coupled PBM-DEM-CFD framework. 7<sup>th</sup> International Granulation workshop, Sheffield, UK, 2015.
- 14 R. Singh, M. Ierapetritou and **R. Ramachandran**. Plant-wide control of a continuous tablet manufacturing process for Quality-by-Design based pharmaceutical manufacturing, ESCAPE 2015, Copenhagen, Denmark, 2015.
- 13 D. Barrasso, A. Tamrakar, **R. Ramachandra**. Multi-scale modelling and high performance computing of wet granulation processes. World Congress of Particle Technology, Beijing, China, 2014.
- 12 D. Barrasso and **R. Ramachandran**. Multi-scale modelling of wet granulation processes. 13<sup>th</sup> Population balance modelling conference, Bangalore, India, 2013.
- 11 D. Barrasso, A. El-Hasgry, J. Litster and **R. Ramachandran**. Multi-scale modeling and validation of twin screw granulation processes. 6<sup>th</sup> International Granulation workshop, Sheffield, UK, 2013.
- 10 R. Singh, M. Ierapetritou and **R. Ramachandran**. Hybrid advanced control of flexible multipurpose continuous tablet manufacturing process via direct compaction. ESCAPE 2013, Lapreenta, Finland, 2013.
- 9 **R. Ramachandran**. Multi-scale modeling of Batch/Continuous Granulation Processes. 5<sup>th</sup> International Granulation Workshop Lausanne, Switzerland, 2011
- 8 **R. Ramachandran**. A Multi-scale Approach to Granulation Process Design. ESCAPE 2011, Greece, 2011.
- 7 **R. Ramachandran**. Multi-Dimensional Population Balance Modeling and Control of Granulation Processes. PSE ASIA 2010, Singapore, 2010.
- 6 **R. Ramachandran**, C.D. Immanuel, F. Stepanek, J.D. Litster and F.J. Doyle III. Experimental Validation of a Multi-dimensional Population balance Model Incorporating Breakage. 13<sup>th</sup> European Conference on Mixing, London, UK, 2009.
- 5 **R. Ramachandran**, J. Poon, C.F.W. Sanders, T. Glaser, F.J. Doyle III, J.D. Litster, F. Stepanek, F.Y. Wang, I.T. Cameron and C.D. Immanuel. A Three-dimensional Population Balance Model of Granulation employing Mechanistic Kernels. European Congress of Chemical Engineering -6, Copenhagen, Denmark, 2007.
- 4 **R. Ramachandran**, J. Poon, F.J. Doyle III, J.D. Litster, F. Stepanek and C.D. Immanuel. A Mechanistic Model for the Nucleation and Aggregation Phenomena in Population Balances of Granulation. Coimbatore Institute of Technology International Conference on Modelling and

- Simulation*, Coimbatore, Tamil Nadu, India, 2007.
- 3 F. Stepanek, P. Rajniak, R. Chern, C. Mancinelli and **R. Ramachandran**. Modeling of multi-component granule formation in a wet granulation process. *Fifth World Congress on Particle Technology*, Lake Buena Vista, Florida, USA, 2006.
  - 2 **R. Ramachandran**, S. Lakshminarayanan and G.P. Rangaiah. Investigating Chaos in an Industrial Fluid Catalytic Cracking Unit. *American Control Conference*, Portland, Oregon, USA
  - 1 **R. Ramachandran**, S. Lakshminarayanan and G.P. Rangaiah. Detection of Nonlinearities and their Impact on Control Loop Performance. *National Conference on Control and Dynamical Systems*, Mumbai, India.

## CONFERENCE PRESENTATIONS

- 92 A.Dan, **R. Ramachandran**. Development of a multi-dimensional PBM using a breakage mode probability kernel for prediction of granule quality attributes . Oral presentation at *AICHE annual meeting*, Phoenix, AZ, USA, 2022.
- 91 Z. Dholakia, I. Muthancheri, L. Venkat, **R. Ramachandran**. Mechanistic understanding of bi-component segregation in high shear wet granulation. Oral presentation at *AICHE annual meeting*, Boston, MA, USA, 2021.
- 90 I. Muthancheri, **R. Ramachandran**. A population balance model description of nucleation and aggregation in bi-component high shear wet granulation. Oral presentation at *AICHE annual meeting*, Boston, MA, USA, 2021.
- 89 L. Venkat, **R. Ramachandran**. Mechanistic understanding of mixing in twin-screw granulation. Oral presentation at *AICHE annual meeting*, Boston, MA, USA, 2021.
- 88 C. Sampat, **R. Ramachandran**. Optimizing energy efficiency of a twin-screw granulation process using a physics constrained hybrid model. Oral presentation at *AICHE annual meeting*, Boston, MA, USA, 2021.
- 87 S. Muddu, **R. Ramachandran**. Validation of combined PBM-RTD technique to simulate continuous granulation. Oral presentation at *AICHE annual meeting*, Orlando, FL, USA, 2019.
- 86 R. Singh, **R. Ramachandran**, M. Ierapetritou, F.J. Muzzio. Industry 4.0: Advanced bi-layer control system for continuous manufacturing of pharmaceuticals. Oral presentation at *AICHE annual meeting*, Orlando, FL, USA, 2019.
- 85 N. Metta, M. Ierapetritou, **R. Ramachandran**. An efficient data-based methodology to identify the design space of continuous pharmaceutical manufacturing processes. Oral presentation at *AICHE annual meeting*, Orlando, FL, USA, 2019.
- 84 C. Sampat, **R. Ramachandran**. Advanced statistical modeling and analysis of multi-scale pharmaceutical manufacturing data. Poster presentation at Machine learning in science and engineering, Conference held by the Institute of Data Engineering and Science, Georgia Technology. Atlanta, GA, USA, 2019.
- 83 I. Muthancheri, **R. Ramachandran**. Mechanistic understanding of hydrophobicity on bi-component high shear wet granulation growth. Oral presentation at *AICHE annual meeting*, Pittsburg, PA, USA, 2018.
- 82 N. Metta, M. Ierapetritou, **R. Ramachandran**. Sensitivity analysis and identification of feasible region of a wet granulation process. Oral presentation at *AICHE annual meeting*, Pittsburg, PA, USA, 2018.
- 81 R. Singh, F. Muzzio, M. Ierapetritou, **R. Ramachandran**. Advanced model predictive control of powder level in continuous pharmaceutical manufacturing pilot plant. Oral presentation at *AICHE annual meeting*, Minneapolis, MN, USA, 2017.
- 80 A. Roman-Ospino, S. Oka, S. Moghtadernejad, S. Escotet, R. Singh, **R. Ramachandran**, M. Ierapetritou, F. Muzzio. Reduced order-discrete element method modeling of comilling for efficient integration into continuous process. Oral presentation at *AICHE annual meeting*, Minneapolis, MN, USA, 2017.
- 79 R. Singh, F. Muzzio, M. Ierapetritou, **R. Ramachandran**. Integrated control and data management system for continuous pharmaceutical manufacturing process. Oral presentation at *AICHE annual meeting*, Minneapolis, MN, USA, 2017.
- 78 N. Metta, M. Ierapetritou, **R. Ramachandran**. Reduced order-discrete element method modeling of comilling for efficient integration into continuous process. Oral presentation at *AICHE annual meeting*, Minneapolis, MN, USA, 2017.
- 77 N. Metta, M. Ierapetritou, **R. Ramachandran**. A combined experimental and computational approach using discrete element method for the development of a mechanistically motivated

- breakage kernel. Oral presentation at *AICHE annual meeting*, San Francisco, CA, USA, 2016.
- 76 R. Singh, F. Muzzio, **R. Ramachandran**, M. Ierapetritou. Advanced flexible control system implementation into direct compaction continuous pharmaceutical manufacturing pilot-plant. Oral presentation at *AICHE annual meeting*, San Francisco, CA, USA, 2016.
- 75 A. Chaturbedi, N. Shapley, **R. Ramachandran**. Development of population balance model and semi-mechanistic layering kernel for two-stage heteroaggregation of oppositely charged micro- and nano-particles. Oral presentation at *AICHE annual meeting*, San Francisco, CA, USA, 2016.
- 74 A. Chaturbedi, F. Bettencourt, S. Mushnoori, S. Karakala, S. Jha, M. Ierapetritou, **R. Ramachandran**. Cyberinfrastructure Enabled Parallelization of Population Balance Models for Efficient Simulation of Granulation Processes. Oral presentation at *AICHE annual meeting*, San Francisco, CA, USA, 2016.
- 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.
- 73 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.
- 72 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.
- 71 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.
- 70 M. Sen, S. Karkala, S. Panikar, O. Lyngberg, M.C. Johnson, E. Schafer, A. Marchut, **R. Ramachandran**. Analyzing the mixing dynamics of an industrial batch bin blender. Annual ISPE meeting, Philadelphia, PA, USA 2015.
- 69 A. Tamrakar, A. Gunadi, P. M. Piccione, **R. Ramachandran**. Modeling of granulation behavior in an agitated filter dryer. Rutgers-BMS day, Bristol-Myers Squibb, New Brunswick, NJ, USA 2015.
- 68 S. Panikar, P. Pawar, S. Talwar, J. Drennen, R. Friedman, H. Wu, F. Muzzio, **R. Ramachandran**. Using experimental and modeling approaches to understand a blending process. Rutgers-BMS day, Bristol-Myers Squibb, New Brunswick, NJ, USA 2015.
- 67 M. Sen, S. Karkala, S. Panikar, O. Lyngberg, M.C. Johnson, E. Schafer, A. Marchut, **R. Ramachandran**. Analyzing the mixing dynamics of an industrial batch bin blender. Rutgers-BMS day, Bristol-Myers Squibb, New Brunswick, NJ, USA 2015.
- 66 F. Bettencourt, A. Chaturbedi, **R. Ramachandran**. Parallelization of multi-dimensional population balance models. *Annual NJ ISPE meeting*, New Brunswick, NJ, USA 2015.
- 65 S. Panikar, P. Pawar, S. Talwar, J. Drennen, R. Friedman, H. Wu, F. Muzzio, **R. Ramachandran**. Using experimental and modeling approaches to understand a blending process. NIPTE research conference: Pharmaceutical critical path manufacturing-2015, Rockville, MD, USA 2015.
- 64 M. Sen, S. Karkala, S. Panikar, O. Lyngberg, M.C. Johnson, E. Schafer, A. Marchut, **R. Ramachandran**. Analyzing the mixing dynamics of an industrial batch bin blender. NIPTE research conference: Pharmaceutical critical path manufacturing-2015, Rockville, MD, USA 2015.
- 63 M. Sen, S. Karkala, S. Panikar, O. Lyngberg, M.C. Johnson, E. Schafer, A. Marchut, **R. Ramachandran**. Analyzing the mixing dynamics of an industrial batch bin blender. Annual NJ ISPE meeting, New Brunswick, NJ, USA 2015.
- 62 A. Tamrakar, A. Gunadi, P. M. Piccione, **R. Ramachandran**. Modeling of granulation behavior in an agitated filter dryer. *7<sup>th</sup> International Granulation workshop*, Sheffield, UK, 2015.
- 61 A. Tamrakar, A. Gunadi, P. M. Piccione, **R. Ramachandran**. Modeling of granulation behavior in an agitated filter dryer. NIPTE research conference: Pharmaceutical critical path manufacturing-2015, Rockville, MD, USA 2015.
- 60 A. Tamrakar, A. Gunadi, P. M. Piccione, **R. Ramachandran**. Modeling of granulation behavior in an agitated filter dryer. *Annual NJ ISPE meeting*, New Brunswick, NJ, USA 2015.
- 59 S. Oka, H. Emady, D. Smrcek, O. Kaspar, V. Tokarova, F. Muzzio, F. Stepanek, **R. Ramachandran**. Understanding Content Non-Homogeneity in High Shear Wet Granulation: Effects of Powder Segregation, Preferential Wetting and Solubility. *7<sup>th</sup> International Granulation workshop*, Sheffield, UK, 2015.
- Singh, R., Sahay, A., Ierapetritou, M., **Ramachandran, R.**, Muzzio, F. J. (2015).  
 58 Advanced Feed-forward/feed-back Control of Continuous Pharmaceutical Tablet Manufacturing Process. Oral presentation at *IFPAC 2015*, Arlington, VA, USA.
- 57 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, USA.

- 56 D. Barrasso and **R. Ramachandran**. Multi-scale modeling of continuous granulation processes. *50<sup>th</sup> AAPS Arden conference*, Baltimore, MD, 2015.
- 55 D. Barrasso and **R. Ramachandran**. Multi-scale modeling of wet granulation processes in gPROMS: PBM-DEM coupling. *Beyond Process Simulation: Computational Fluid Dynamics (CFD) for the Chemical Process and Pharmaceutical Industries*, Cambridge, MA, 2014.
- 54 D. Barrasso and **R. Ramachandran**. Multi-scale modeling of wet granulation processes in gPROMS: PBM-DEM coupling. *Beyond Process Simulation: Computational Fluid Dynamics (CFD) for the Chemical Process and Pharmaceutical Industries*, Princeton, NJ, 2014.
- 53 S. S. Panikar, S. Wu, B. J. Glasser, **R. Ramachandran** “Off-line and in-line monitoring of mulling processes using NIR” *17th International Diffuse Reflectance Conference (IDRC)*, Chambersburg, PA, 2014
- 52 S. S. Panikar, S. Wu, B. J. Glasser, **R. Ramachandran** “Off-line and in-line monitoring of mulling processes” *53rd Eastern Analytical Symposium (EAS)*, Somerset, NJ, 2014
- 51 D. Barrasso, J. Li, K. Debus, R. Algave, T. Eppinger, S. Bermingham and **R. Ramachandran**. Multi-scale modeling of powder processes: bidirectional coupling of population balance models in gPROMS with discrete element models in Star-CCM+. *Advanced Process Modeling Forum*, London, UK, 2014.
- 50 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.
- 49 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.
- 48 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.
- 46 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, 2014.
- 45 D. Barrasso, **R. Ramachandran**. Multi-scale modelling and validation of pharmaceutical processes. *IFPAC*, Arlington, VA, USA, 2014
- 44 R. Singh, A. Sahay, K. Karry, M. Sen, R. Romanach, F. Muzzio, M. Ierapetritou, **R. Ramachandran**. Advanced hybrid MPC-PID based closed-loop control of continuous pharmaceutical tablet manufacturing processes. *IFPAC*, Arlington, VA, USA, 2014
- 43 O. Kaspar, V.Tokarova, S. Oka, **R. Ramachandran**. F. Stepanek. Determination of Structure, Porosity and API distribution in Granules by Computed Micro-Tomography. *AICHE Annual Meeting*, San Francisco, CA, 2013.
- 42 R. Singh, M. Ierapetritou, **R. Ramachandran**. Design of an efficient control system for a flexible continuous pharmaceutical manufacturing process. *AICHE Annual Meeting*, San Francisco, CA, 2013.
- 41 R. Singh, M. Ierapetritou, **R. Ramachandran**. Implementation of advanced hybrid MPC-PID control for a continuous tablet manufacturing process. *AICHE Annual Meeting*, San Francisco, CA, 2013.
- 40 R. Singh, M. Ierapetritou, **R. Ramachandran**. Design and implementation of an efficient control system in a continuous pharmaceutical manufacturing process via roller compaction. *IFPAC*, Baltimore, MD, USA, 2013
- 39 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.
- 38 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>.
- 37 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>.
- 36 S. Oka, K. Sowrirajan, O. Kaspar, V. Tokarova, A. Chaudhury, F. Stepanek, **R. Ramachandran**. Understanding Content Non-Homogeneity in High Shear Wet Granulation: Effects of Powder Segregation, Preferential Wetting and Solubility. *6<sup>th</sup> International Granulation workshop*, Sheffield, UK, 2013.
  - 35 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.
  - 34 M. Armenante, A. Chaudhury, **R Ramachandran**. Multi-scale modeling of fluid bed granulation processes. *ISPE Annual meeting*, Washington D.C., 2013.
  - 33 M. Armenante, A. Chaudhury, **R Ramachandran**. Multi-scale modeling of fluid bed granulation processes. *ISPE meeting NJ Chapter*, New Brunswick, NJ, 2013.
  - 32 M. Sen, A. Chaudhury, J. John, R. Singh, **R. Ramachandran**. Multi-scale flowsheet simulation for the purification and processing of active pharmaceutical ingredients. *AICHE Annual Meeting*, Pittsburg, PA, 2012.
  - 31 D. Barrasso and **R. Ramachandran**. Multi-scale modeling and validation of twin screw granulation processes. *AICHE Annual Meeting*, Pittsburg, PA, 2012.
  - 30 R. Singh, M. Ierapetritou and **R. Ramachandran**. Design and implementation of an efficient control system in a continuous pharmaceutical manufacturing process via roller compaction. *AICHE Annual Meeting*, Pittsburg, PA, 2012.
  - 29 R. Singh, M. Ierapetritou and **R. Ramachandran**. Plant-wide hybrid MPC of a continuous pharmaceutical tablet manufacturing process via direct compaction. *AICHE Annual Meeting*, Pittsburg, PA, 2012.
  - 28 **R. Ramachandran**, R. Singh, M. Ierapetritou. Model-based control of an integrated and continuous downstream pharmaceutical process. *IFPAC*, Baltimore, MD, USA, 2012.
  - 27 F. Boukouvala, **R. Ramachandran**, F. Muzzio, M. Ierapetritou. Dynamic flowsheet simulation of continuous pharmaceutical manufacturing. *IFPAC*, Baltimore, MD, USA, 2012.
  - 26 M. Sen and **R. Ramachandran**. A Multi-scale Approach to Continuous Blending Processes. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 25 A. Nizolek, A. Chaudhury, **R Ramachandran**. Multi-scale modeling of fluid bed granulation processes. *ISPE Annual meeting*, Dallas, TX, 2011.
  - 24 A. Nizolek, A. Chaudhury, **R Ramachandran**. Multi-scale modeling of fluid bed granulation processes. *ISPE meeting NJ Chapter*, New Brunswick, NJ, 2011.
  - 23 **R. Ramachandran**, A. Chaudhury, P. Pandey, J. Tao, J. Gao, D. Bindra, A. Narang. Model-based control of high-shear wet granulation processes. *AAPS Annual Meeting & Exposition*, Washington DC, USA, 2011.
  - 22 A. Prakash and **R. Ramachandran**. Efficient Simulation of Population Balance Models via Parallel and Distributed Computing. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 21 A. Chaudhury, P. Pandey and **R. Ramachandran**. A multi-dimensional population balance model validation approach to high-shear wet granulation (HSWG) processes. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 20 **R. Ramachandran**, A. Chaudhury and M. Ierapetritou. Model-based control of an integrated continuous pharmaceutical manufacturing process. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 19 A. Chaudhury, J.E. Tabora, B. Remy and **R. Ramachandran**. Application of a 2-D Population Balance Model to Pharmaceutical Crystallization Processes. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 18 P. Pandey, J. Tao, J.Z. Gao, D. Bindra, A. Narang, **R. Ramachandran** and A. Chaudhury. A combined experimental and modeling approach to the scale-up of high-shear wet granulation. *AICHE Annual Meeting*. Minneapolis, MN, 2011.
  - 17 F. Boukouvala, V. Niotis, L. Miodusezewski, A.U. Vanarase, **R. Ramachandran**, F.J. Muzzio and M.G. Ierapetritou. Dynamic flowsheet modeling and sensitivity analysis of continuous pharmaceutical manufacturing. *AICHE Annual Meeting*, Minneapolis, MN, 2011.
  - 16 **R. Ramachandran**. Hierarchical control of a MIMO granulation process. *5th International Granulation Workshop Lausanne*, Switzerland, 2011.
  - 15 **R. Ramachandran**. Modeling the effect of relative humidity on median granule size and distribution width. *AICHE Annual Meeting*, Salt Lake City, UT, USA, 2010.

- 14 **R. Ramachandran.** Efficient Evaluation of Multi-dimensional Source Term Integrals in Population Balance Models. *AIChE Annual Meeting*, Salt Lake City, UT, USA, 2010.
- 13 **R. Ramachandran.** Multi-dimensional population balance modeling and control of granulation processes. *Population balance modeling conference 2010*, Berlin, Germany, 2010.
- 12 **R. Ramachandran** and P. I. Barton. Effective Parameter Estimation within a Multi-Dimensional Population Balance Model Framework. *AIChE Annual Meeting, Nashville*, TN, USA, 2009.
- 11 **R. Ramachandran** and P. I. Barton. A Quantitative Assessment of the Effect of Primary Particle Size Distribution on Granule Inhomogeneity: Modelling and Experiments. *AIChE Annual Meeting, Nashville*, TN, USA, 2009.
- 10 **R. Ramachandran** and P. I. Barton. Controllability Analysis and Identification of Optimal Control-Loop Pairings in a Multiple-Input Multiple-Output Granulation Process. *AIChE Annual Meeting, Nashville*, TN, USA, 2009.
- 9 **R. Ramachandran** and P. I. Barton. Effective Parameter Estimation within a Multi-Dimensional Population Balance Model Framework. *IFPRI Annual General Meeting*, Ann Arbor, MI, USA, 2009.
- 8 **R. Ramachandran**, F.J. Doyle III, J.D. Litster, F. Stepanek, and C.D. Immanuel. A Combined Mechanistic model for Nucleation, Aggregation and Breakage in Population Balances of Granulation. *AIChE Annual Meeting*, Philadelphia, PA, USA, 2008.
- 7 **R. Ramachandran**, J. Poon, C.F.W. Sanders, T. Glaser, F.J. Doyle III, J.D. Litster, F. Stepanek, F.Y. Wang, I.T. Cameron and C.D. Immanuel. A Mechanistic model for Nucleation and Aggregation in Population Balances of Granulation: Batch Characterisation and Validation. *AIChE Annual Meeting*, Salt Lake City, Utah, USA, 2007.
- 6 T. Glaser, C.F.W. Sanders, F.Y. Wang, I.T. Cameron, J.D. Litster, J. Poon, **R. Ramachandran**, C.D. Immanuel and F.J. Doyle III. Model Predictive Control of Continuous Drum Granulation of Limestone. *AIChE Annual Meeting*, Salt Lake City, Utah, USA, 2007.
- 5 **R. Ramachandran**, J. Poon, C.F.W. Sanders, T. Glaser, F.J. Doyle III, J.D. Litster, F. Stepanek, F.Y. Wang, I.T. Cameron and C.D. Immanuel, "A Three-dimensional Population Balance Model of Granulation with Mechanistic and Phenomenological Kernels. *3rd International Conference on the Population Balance Modelling*, Québec city, Quebec, Canada, 2007.
- 4 **R. Ramachandran**, J. Poon, F.J. Doyle III, J.D. Litster, F. Stepanek and C.D. Immanuel. Batch Characterisation Studies on Drum Granulation: Formulation Properties and Growth Kinetics. *Third International Granulation Workshop*, University of Sheffield, Sheffield, United Kingdom
- 3 **R. Ramachandran**, J. Poon, F. Stepanek, C.D. Immanuel, F.J. Doyle III, J.D. Litster and I.T. Cameron. A Mechanistic Kernel for Aggregation and Nucleation Phenomena in Population Balance Models of Granulation. *AIChE Annual Meeting*, San Francisco, California, USA, 2006.
- 2 **R. Ramachandran**, J. Poon, C.D. Immanuel, F.J. Doyle III and F. Stepanek. A Mechanistic Description of the Aggregation Phenomenon in Population Balances Granulation. Engineering Conferences *International Control of Particulate Processes VII*, Harrison Hot Springs, British Columbia, Canada, 2006.
- 1 **R. Ramachandran**, J. Poon, F. Stepanek, C.D. Immanuel, F.J. Doyle III, J.D. Litster and I.T. Cameron. A Mechanistic Kernel for Aggregation and Nucleation Phenomena in Population Balance Models of Granulation. *UK Particle Technology Forum*, London, UK, 2006.

## INVITED SEMINARS/COURSES

- 52 **R. Ramachandran.** Modern modeling tools for small molecule solid dose manufacturing. Catalent webinar series, NJ, USA, 2023.
- 51 **R. Ramachandran.** Energy-efficient smart manufacturing of pharmaceutical products. Joint conference by IIT Ropar, India and Hamburg University of Technology, Germany, Chandigarh, India, 2023.
- 50 **R. Ramachandran.** Enabling energy-efficient manufacturing of pharmaceutical products. University of Leeds, Leeds, United Kingdom, 2022.
- 49 **R. Ramachandran.** PSE based solutions for solid dose pharmaceutical manufacturing processes. Roche, Basel, Switzerland, 2019.
- 48 **R. Ramachandran.** PSE based solutions for solid dose pharmaceutical manufacturing processes. Imperial College London, London, United Kingdom, 2019.
- 47 **R. Ramachandran.** PSE based solutions for solid dose pharmaceutical manufacturing processes.

- University of Limerick, Limerick, Republic of Ireland, 2019.
- 46 **R. Ramachandran.** Process modeling and control of solid dose forms via continuous manufacturing. Cork Institute of Technology, Cork, Republic of Ireland, 2019.
- 45 **R. Ramachandran.** Mixing and segregation in wet granulation processes. Blending and segregation conference, Purdue University, West Lafayette, IN, USA, 2019.
- 44 **R. Ramachandran.** Mechanistic modeling of wet granulation processes. TU Hamburg, Hamburg, Germany, 2018.
- 43 **R. Ramachandran.** The genesis of content non-uniformity in high shear wet granulation. ICT Prague, Prague, Czech Republic, 2018.
- 42 **R. Ramachandran.** Process control, sensing and automation of continuous tablet manufacturing processes: toward QbD and RTRT. PMTC, Limerick, Republic of Ireland, 2018.
- 41 **R. Ramachandran.** Dynamic flowsheet modeling: effect of CPPs and CMAs on CQAs. IFPAC Annual meeting, Bethesda, MD, USA, 2017.
- 40 **R. Ramachandran.** Multi-phase CFD-DEM-PBM model for fluid bed wet granulation. STAR CCM+ conference, Berlin, Germany, 2017.
- 39 **R. Ramachandran.** Process control, sensing and automation of continuous tablet manufacturing processes: toward QbD and RTRT. University of Limerick, Limerick, Republic of Ireland, 2016.
- 38 **R. Ramachandran.** Modeling wet granulation: The basis of dynamic flowsheet modeling. *AAPS Annual meeting and exposition*, Denver, CO, 2016.
- 37 **R. Ramachandran.** Process control, sensing and automation of continuous tablet manufacturing processes: toward QbD and RTRT. TU Hamburg, Hamburg, Germany, 2016.
- 36 **R. Ramachandran.** Process control, sensing and automation of continuous tablet manufacturing processes: toward QbD and RTRT. University of Tokyo, Tokyo, Japan, 2016.
- 35 **R. Ramachandran.** Process control, sensing and automation of continuous tablet manufacturing processes: toward QbD and RTRT. RCPE, TU Graz, Graz, Austria, 2016.
- 34 **R. Ramachandran.** Integrated PBM-DEM modeling of a continuous granulation process. STAR CCM+ conference, Prague, Czech Republic, 2016.
- R. Ramachandran.** Modeling wet granulation: Challenges in discrete element methods and population balance models. *AAPS Annual meeting and exposition*, Orlando, FL, 2015.
- 33 **R. Ramachandran.** Process control, integration and mechanistic modeling of particulate processes. Brewer Science, Rolla, MO, 2015. (1 day course)
- 32 **R. Ramachandran.** Predictive modeling of wet granulation processes in catalyst manufacturing. Evonik, Marl, Germany, 2015.
- 31 **R. Ramachandran.** Multi-scale model development and validation of wet granulation processes: toward QbD in pharmaceutical manufacturing. *Novartis*, Basel, Switzerland, 2015.
- 30 **R. Ramachandran.** Multi-scale model development and validation of wet granulation processes. BASF, Ludwigshafen, Germany, 2015.
- 29 **R. Ramachandran.** Advanced process control and sensor integration on continuous pharmaceutical manufacturing processes. Dept of Chemical Engineering, University of Tokyo, Tokyo, Japan, 2015.
- 28 **R. Ramachandran.** Integration of PAT, process modeling and control in the continuous manufacture of pharmaceutical tablets, 13<sup>th</sup> New Pharmaceutical Technology and Engineering (NPTE) Conference, Tokyo, Japan, 2015.
- 27 **R. Ramachandran.** Flowsheet modeling and control of continuous pharmaceutical manufacturing processes. Janssen supply chain (JSC) leadership meeting, Newark, NJ, 2015.
- 26 **R. Ramachandran.** Mechanistic modeling of mixer-granulator processes: toward QbD in pharmaceutical manufacturing. NIPTE research conference: Pharmaceutical critical path manufacturing-2015, Rockville, MD, 2015.
- 25 **R. Ramachandran.** Integration of sensors, process modeling, and control in the continuous manufacture of pharmaceutical tablets and strip films: toward QbD and PAT. Brewer Science, Rolla, MO, 2015.
- 24 **R. Ramachandran.** Modeling, control and optimization of continuous direct compaction pharmaceutical manufacturing processes. IFPAC SUMMIT 2015 Conference, San Juan, PR, USA, 2015.
- 23 **R. Ramachandran.** Control systems in continuous manufacturing. Bristol Myers Squibb (BMS) day event, New Brunswick, NJ, USA, 2015.
- 22 **R. Ramachandran.** Multi-scale model development and validation of wet granulation processes. Bristol Myers Squibb (BMS) day event, New Brunswick, NJ, USA, 2014.
- 21 **R. Ramachandran.** A novel continuous pharmaceutical tablet manufacturing process integrated
- 20

- with inline PAT tools and an automated control system. Annual International Society of Pharmaceutical Engineering (ISPE), Las Vegas, NV, USA, 2014.
- 19 **R. Ramachandran.** Multi-scale model development and validation of wet granulation processes. City College of New York (CCNY), New York, NY, USA, 2014.
  - 18 **R. Ramachandran.** Multi-scale model development and validation of wet granulation processes. Bristol Myers Squibb (BMS) day event, New Brunswick, NJ, USA, 2014.
  - 17 **R. Ramachandran.** Modeling, control and optimization of continuous direct compaction pharmaceutical manufacturing processes. IFPAC SUMMIT 2013 Conference, San Juan, PR, USA, 2013.
  - 16 **R. Ramachandran.** Introductions and application of advanced process control in Pharmaceutical processes. Bristol Myers Squibb, New Brunswick, USA, 2013. (1 day course)
  - 15 **R. Ramachandran.** Multi-scale modeling of particulate processes. Leeds University, Leeds, UK, 2013.
  - 14 **R. Ramachandran.** Flexible multipurpose continuous processing of a pharmaceutical tablet manufacturing process. Advanced Process Modeling Forum, London, UK, 2013.
  - 13 **R. Ramachandran.** Agglomeration modelling of wet granulation processes. Western Michigan University, Kalamazoo, MI, USA, 2013.
  - 12 **R. Ramachandran.** Modeling and control of particulate processes. Purdue University, West Lafayette, USA, 2013.
  - 11 **R. Ramachandran.** Towards QbD in continuous pharmaceutical manufacturing: Modeling and control strategies. Werum user meeting, Luneburg, Germany, 2012.
  - 10 **R. Ramachandran.** Dynamic flowsheet simulation of continuous pharmaceutical manufacturing processes. Advanced Process Modeling Forum, London, UK, 2012.
  - 9 **R. Ramachandran.** Modeling and experimental validation of spray drying processes. Unilever, Bedford, UK, 2012.
  - 8 **R. Ramachandran.** Population balance modeling of biological systems. New York Academy of Sciences, New York, USA, 2012
  - 7 **R. Ramachandran.** Aggregation modeling in wet granulation processes. P&G, Newcastle, UK, 2011.
  - 6 **R. Ramachandran.** Modeling and control of downstream pharmaceutical processes. NJAICHe, Scotch Plains, NJ, USA, 2011.
  - 5 **R. Ramachandran.** Aggregation modeling in wet granulation processes. P&G, Cincinnati, OH, USA, 2011.
  - 4 **R. Ramachandran.** Modeling and control of downstream pharmaceutical processes. Merck, West Point, PA, USA, 2010.
  - 3 **R. Ramachandran.** Modeling and control of downstream pharmaceutical processes. Association of Consulting Chemists & Chemical Engineers, Inc, Scotch Plains, NJ, USA, 2010
  - 2 **R. Ramachandran.** Modeling and control of downstream pharmaceutical processes. Bristol Myers Squibb, New Brunswick, USA, 2010.
  - 1 **R. Ramachandran.** Introduction to MATLAB and its application to Engineering Problems. Institute of Electrical and Electronic Engineers Singapore Chapter, National University of Singapore, Singapore, 2005.

### **EXTERNAL ACADEMIC COLLABORATORS**

Dr. Jerry Heng – Imperial, Prof. Krist Gernaey – DTU, Prof. Stefan Heinrich, Dr. Maksym Dosta – Hamburg Uni, Prof. Gerald Warnecke – Uni of Magdeburg, Prof. Johannes Khinast – TU Graz, Profs. Rex Reklaitis, Zoltan Nagy – Purdue Uni., Prof. Gavin Walker, Uni. of Limerick, Prof. Gavin Andrews – QUB, Prof. Jim Litster, Uni. of Sheffield, Prof. Venkat Venkatasubramanian, Columbia Uni.

### **EXTERNAL INDUSTRIAL COLLABORATORS**

Dr. P. Pandey – BMS, USA, Dr. H. Ahmadian - P&G, UK, Dr. M. Ansari – Unilever, UK, Dr. P. Piccione – Roche – Switzerland, Dr. J. Tabora – BMS, USA, Dr. S. Bermingham – Process Systems Enterprise, UK, Dr. P. Schmal, Process Systems Enterprise, USA, Dr. Mauricio Futram, Janssen, USA. Dr. Benoit Inge, GSK, USA. Dr. Thomas O’Connors, U.S. Food & Drug Administration, USA.

### **PROFESSIONAL ACTIVITIES & SERVICE**

**Conferences and Meetings** World Congress of Particle Technology – Chair for session on

	<p>Granulation, 2010.</p> <p>PSE Asia 10 – Chair for session on Data Reconciliation Methods, 2010.</p> <p>AIChE Annual Meeting – Chair for session on Population Balance Modeling, Mixing and Segregation, 2010, 2011, 2012, 2013, 2014, 2015</p> <p>Control and Optimization of particle and solids production processes, 2014</p> <p>American Institute of Chemical Engineers (AIChE) – Chair of Particle Technology Forum program Area 3A</p> <p>Population Balance Modeling 2013 – Co-head and Member of Scientific committee</p> <p>Population Balance Modeling 2016 – Member of Scientific committee</p> <p>Granulation workshop 2015, 2017, 2019 – Member of Scientific committee, Session Chair.</p>
<b>Proposal Reviewer</b>	<p>Research Council for Natural Sciences and Engineering at the Academy of Finland, 2010</p> <p>NSF Panel – Particulate and Multiphase Processes, 2011, Process &amp; Reaction Engineering CAREER panel, 2014, SBIR &amp; STTR, 2016 – Present.</p> <p>NSF email – Metals and Metallic Nanostructures, 2013</p> <p>Science Foundation Ireland, Investigator program, 2014.</p> <p>Elsevier, Linked Engineering and Manufacturing platform book proposal, 2015.</p>
<b>Journal Reviewer</b>	<p>Chemical Engineering Science</p> <p>Computers and Chemical Engineering</p> <p>AIChE Journal</p> <p>Asia-Pacific Journal of Chemical Engineering</p> <p>Powder Technology</p> <p>European Journal of Pharmaceutics and Biopharmaceutics</p> <p>Advanced Powder Technology</p> <p>Chemical Engineering Research &amp; Design</p> <p>Processes</p> <p>International Journal of Pharmaceutics &amp; BioPharmaceutics.</p> <p>Pharmaceutical Research</p> <p>Journal of Advanced Manufacturing and Processing</p>
<b>Professional Associations</b>	<p>American Institute of Chemical Engineers (AIChE) – Member</p> <p>International Society of Pharmaceutical Engineering (ISPE) (2011, 2014, 2015)– Faculty Advisor</p> <p>American Association of Pharmaceutical Scientists (AAPS) – Member</p>
<b>Departmental committees</b>	<p>Chemical Engineering Faculty Search Committee (2010, 2011, 2013, 2017) – Member, (2014) – Chair.</p> <p>Mechanical Engineering Faculty Search Committee (2010) – Member</p> <p>Graduate Admissions Committee (2010) – Member, (2011-2013) – Chair</p> <p>PhD Qualifying exam committee (2010, 2011, 2012, 2013, 2015) – Member</p> <p>CBE Social media committee – 2019 to Present</p>
<b>Departmental collaborations</b>	<p>Established local area training (LAT) agreement with software company (PSE) to facilitate the installation/use of their software in dept. microlab by students</p>
<b>University committees</b>	<p>Disciplinary Committee, 2011</p> <p>School of Engineering (SoE) high performance computing committee, 2011.</p>
<b>Masters Thesis committees</b>	<p>Rutgers University</p>

- Amalia Nikopolou
- Vidyalaxmi Muthukumar
- Wei Meng
- Atish Kulkarni
- Shiwen Sun
- Hao Chen
- Ahmed Jaffar
- 

**Doctoral Thesis committees**

Rutgers University – Chair

- Keyaara Robinson
- Ou Yang
- Pooja Bhalode
- Yijie Gao
- Nikisha Shah
- Fani Boukouvala
- Daniel Braido
- Kristin Steely
- Niranjana Kottala
- Juan Osorio
- Mehdi Ghodbone (BME)
- Amanda Rogers
- William Engisch
- Lin Zhaojia
- Nihar Sahay
- Amanda Rogers
- Sebastian Escotet
- Zilong Wang
- Ou Yang
- Atharv Boshekar
- Hao Chen
- Wei Meng
- Veerakiet Boonkonawong
- Plaman Girigov

Nanyang Technological University, Singapore - External Reviewer

- Aniruddha Majumdar

Monash University, Australia - External Reviewer

- Hong Lee Lim

**Student Accomplishments**

Alexander Niziolek – Winner of NJ ISPE poster contest and was selected to present at the annual ISPE conference in Dallas TX, 2011

Anwasha Chaudhury

- Awarded Austrian Marshall Plan scholarship for research exchange at TU Graz, Austria.
- Winner of NJPhast scholarship
- Awarded Baden-Wuerttemberg scholarship to pursue research at University of Konstanz
- SOE Outstanding graduate student award, 2015.

Dana Barrasso – Winner of NJPhast scholarship

Ashutosh Tamrakar – CBE Outstanding graduate student award, 2019.

Marco Armenante - Winner of NJ ISPE poster contest and was selected to present at the annual ISPE conference in Washington D.C, 2013

Siddhi Hate – Awarded Marshall Plan Scholarship for research exchange at TU Graz, Austria.

Manogna Adepu – Awarded Marshall Plan Scholarship for research exchange at TU Graz, Austria.

Maitraye Sen – Winner of NJ ISPE poster contest and was selected to present at the annual ISPE conference in Dallas TX, 2011

- Winner of NIPTE poster session, 2015.

## **TEACHING ACTIVITIES**

Fall 2010 – 2013	Advanced Chemical Engineering Thermodynamics – CBE 507
Spring 2011 & 2012	Advanced Engineering Pharmaceutical Kinetics, Thermodynamics and Transport Processes – CBE 549
Spring 2013 – Present	Process Simulation and Control – CBE 422
Fall 2014, 2015, 2016	Design 1 – CBE 427
Spring 2017	Advanced Pharmaceutical Unit Operations
Spring 2019, 2021	Graduate professional skills course
Spring 2021, 2022	Computational methods

## **PERSONNEL SUPERVISED**

<b>Postdoctoral Associates</b>	Dr. Jeyarathan Arjunan (November 2010 – April 2011) – co-advised with M. Ierapetritou Dr. Ravendra Singh (November 2011 – Present) – co-advised with M. Ierapetritou Dr. Jun Zang (April 2013 – Oct 2014) – co-advised with R. Dave (NJIT) (Oct 2014 – Present) - co-advised with M. Ierapetritou Dr. Savitha Panikar (February 2014 – Present) Dr. Andres Roman (January 2016 – January 2018)
--------------------------------	--

<b>PhD Students</b>	Ms. Anwesha Chaudhury (December 2010 – January 2015) Ms. Maitraye Sen (December 2010 – May 2015) Mr. Sarang Oka (December 2011 – April 2016) – co-advised with F. Muzzio Ms. Dana Barrasso (December 2011 – December 2015) Mr. Ashutosh Tamrakar (December 2013 – May 2019) Mr. Anik Chaturbedi (December 2013 – May 2019) – co-advised with N. Shapley Ms. Nirupaplava Metta (May 2015 – Present) – co-advised with M. Ierapetritou Mr. Subhodh Karkala (Aug 2016 – 2021) Mr. Shashank Muddu (Jan 2016 – 2021) Mr. Yuktेशwar Baranwal (Aug 2016 – 2021) Ms. Indu Muthancheri (Aug 2016 – 2021) Mr. Chaitanya Sampat (Jan 2019 – 2021) Mr. Lalith Kotamarthy (Jan 2019 – 2021) Ms. Ashley Dan (Fall 2020 – Present)
---------------------	--

### Visiting graduate students

Mr. Andreas Roman (June – August 2014,2015) , Uni of Puerto Rico, Mayaguez  
Ms. Viola Tokaraova (Aug – Sep 2012), ICT Prague  
Mr. Ondrej Kasparov (Aug - Sep 2012), ICT Prague  
Mr. Maximillian Besenhard ( July – Nov 2013), TU Graz, Austria  
Mr Marek Schongut (Nov – Dec 2013), ICT Prague, Czech Republic  
Mr. Thomas Glatz (June – July 2011), TU Graz, Austria

<b>MS thesis Students</b>	Mr. Anuj Varghese Prakash (December 2010 – December 2012) - current position: Texas A&M, postdoctoral associate Ms. Joyce John (December 2011 – May 2013) - current position: unknown Mr. Wu Suyang (December 2012 – May 2014) - current position: Bayer AG Ms. Siddhi Hate (December 2013 – May 2015) - current position: Purdue University, Industrial Pharmacy, PhD student Ms. Manogna Adepu (December 2013 – May 2015)
---------------------------	---

- current position: Arizona State University, Chemical Engineering,  
PhD student

Ms. Suparna Rao (Dec 2014 – May 2016)

Mr. Subhodh Karkala (Jan 2014 – May 2016)

Mr. Lalith Kotamarthy (Jan 2015 – Dec 2017)

Mr. Huiyi Cao (Jan 2015 – Dec 2017)

Ms. Anjali Kataria (Jan 2015 – Dec 2017)

Mr. Chaitanya Sampat (Jan 2017 – Dec 2018)

### **Undergraduates**

Ms. Sania Parvani (Spring 2021 – Present)

Ms. Julia Parzecki (Summer and Fall 2020)

Ms. Ana Carolina da Silva (May 2015 – Aug 2015) – Brazilian exchange  
student

Ms. Yanira Rodriguez (May 2015 – Aug 2015) – REU student

Mr. Marco Armenante (Jan 2013 – May 2014)

- current position: Uni of Delaware, Chemical Engineering, PhD  
student

Ms. Samjit Walia (May 2012 – Aug 2012) – Cooper Union (REU  
program)

- current position: Exxon Mobil

Mr. Frank Zong (June – August 2010) – Boston University

- current position: Business analyst, Tritex solutions

Mr. Alexander Niziolek (August 2010 – Present)

- current position: PhD student, Chemical Engineering, Princeton  
University

Mr. Avi Kapadia (August 2010 – Present)

- current position: Corning

Ms. Deepal Shah (Aug 2010 – May 2011)

- current position: US Army

### **High-school students**

Ms. Manali Mahajan (June – Aug 2013): current position – Cornell, UG

Mr. Vamsi Sanagavarapu (June – Aug 2014):

Mr. Jey Swarup (June – Aug 2016)