Process Intensification in Chemical Engineering

Juan Gabriel Segovia-Hernández
Adrián Bonilla-Petriciolet
Editors

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Design Optimization and Control

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Editors
Juan Gabriel Segovia-Hernández
Universidad de Guanajuato
Guanajuato, Mexico

Adrián Bonilla-Petriciolet
Instituto Tecnológico de Aguascalientes
Aguascalientes, Mexico

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Preface

Today, we are witnessing important new developments that go beyond traditional chemical engineering. Engineers and industrial researchers are working on novel equipment and techniques that potentially could transform our concept of chemical plants and lead to compact, safe, energy-efficient, and environment-friendly sustainable processes. These developments share a common focus on "process intensification," an approach that has been around for quite some time but has truly emerged only in the past few years as a special and interesting discipline of chemical engineering.

Process intensification can be defined as: "Any engineering development that leads to a substantially smaller, cleaner, safer, and more energy-efficient technology." The application of this concept in process system engineering is most often characterized by a significant reduction in plant volume, production costs, waste generation, and also getting improvements, even in orders of magnitude, on process performance and efficiency including the reduction of environmental pollution problems. In recent years, process intensification has attracted considerable academic interest as a potential means for process improvement and to meet the increasing demands for a sustainable production. A variety of intensified operations developed in academia and industry creates a large number of options to potentially improve the process. However, the task for identifying the set of feasible solutions for process intensification in which the optimal can be found may take considerable resources. Hence, a synthesis tool to systematically achieve the process intensification would potentially assist in the generation and evaluation of process options.

Currently, several process design tools with a clear focus on specific process intensification tasks exist. Therefore, this book covers current topics for the design, optimization, and control in the context of process intensification. This book was motivated by the desire we and others have had to show the evolution and advances in this area. Chapters of this book cover a variety of concepts and aspects, involving a variety of processes as case of study and examples, related to process intensification in chemical engineering.

We are deeply indebted to the authors who have contributed to this book. Also, we acknowledge the anonymous reviewers for their time and effort in assisting us with the edition of this book.

Guanajuato, Mexico Juan Gabriel Segovia-Hernández
Aguascalientes, Mexico Adrián Bonilla-Petriciolet

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Contributors

Ricardo Aguilar-López Centre of Research and Advanced Studies, Instituto Politécnico Nacional, Mexico City, Mexico

J. Rafael Alcántara-Avila Tokushima University, Tokushima, Japan

Paloma Andrade-Santacoloma Technical University of Denmark, Lyngby, Denmark

Deenesh K. Babi Department of Chemical & Biochemical Engineering, Technical University of Denmark, Lyngby, Denmark

Adrián Bonilla-Petriciolet Instituto Tecnológico de Aguascalientes, Aguascalientes, Mexico

Irene Cano-Rodríguez Division de Ciencias Naturales y Exactas, Departamento de Ingenieria Quimica, Universidad de Guanajuato, Guanajuato, Mexico

Mauricio Sales Cruz Department of Chemical & Biochemical Engineering, Technical University of Denmark, Lyngby, Denmark

Universidad Autónoma Metropolitana - Cuajimalpa, Delegacion Cuajimalpa de Morelos, Mexico, Denmark

Massimiliano Errico Department of Chemical Engineering, Biotechnology and Environmental Technology, University of Southern Denmark, Odense M, Denmark

Zeferino Gamiño-Arroyo Division de Ciencias Naturales y Exactas, Departamento de Ingenieria Quimica, Universidad de Guanajuato, Guanajuato, Mexico

Rafiqul Gani Department of Chemical & Biochemical Engineering, Technical University of Denmark, Lyngby, Denmark

Fernando I. Gómez-Castro Department of Chemical Engineering, Biotechnology and Environmental Technology, Universidad de Guanajuato, Guanajuato, Mexico

Claudia Gutiérrez-Antonio Facultad de Química, Universidad Autónoma de Querétaro, Santiago de Querétaro, Mexico

Héctor Hernández-Escoto Department of Chemical Engineering, Universidad de Guanajuato, Guanajuato, Mexico

Gladys Jiménez-García Instituto Tecnológico Superior de Pátzcuaro, Pátzcuaro, Mexico

Anton A. Kiss AkzoNobel Research, Development and Innovation, Process Technology Strategic Research Group, Deventer, The Netherlands

Faculty of Science and Technology, Sustainable Process Technology Group, University of Twente, AE, The Netherlands

Hao-Yeh Lee National Taiwan University of Science and Technology, Tapei, Taiwan

Rafael Maya-Yescas Faculty of Chemical Engineering, Universidad Michoacana de San Nicolás de Hidalgo, Ciudad Universitaria, Morelia, Mexico

Paola A. Molano Department of Chemical and Environmental Engineering, Universidad Nacional de Colombia, Sede Bogotá, Bogotá, Colombia

Ricardo Morales-Rodríguez Department of Chemical Engineering, Universidad de Guanajuato, Guanajuato, Mexico

Alvaro Orjuela Department of Chemical and Environmental Engineering, Universidad Nacional de Colombia, Sede Bogotá, Bogotá, Colombia

José María Ponce-Ortega Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Mexico

Oscar Andrés Prado-Rubio Department of Chemical Engineering, Universidad Nacional de Colombia - Manizales, Manizales, Colombia

Ben-Guang Rong University of Southern Denmark, Odense M, Denmark

Miguel A. Santaella Department of Chemical and Environmental Engineering, Universidad Nacional de Colombia, Sede Bogotá, Bogotá, Colombia

Juan Gabriel Segovia-Hernández Universidad de Guanajuato, Guanajuato, Mexico