



Editorial special issue in the journal of flow chemistry: engineering aspects of flow chemistry

Norbert Kockmann¹ · Ryan Hartman² · Amol Kulkarni³

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After months of preparation, drafting, writing and editing we are very proud to introduce a Special Issue Contribution on Engineering Aspects in Flow Chemistry. This Special Issues covers “classical” areas from chemical reactions and related reactors to transport phenomena and particle generation, but also separation processes, digital methods from simulation, design of experiments to self-optimizing reactors, or multi-phase flow environments. The understanding of the different aspects is important for successful application of flow chemistry, since flow processes are more sensible to these phenomena, but often take opportunity from proper control of these phenomena.

However, flow chemistry has an interesting paradox, chemistry comes first and then it flows. So, every synthesis that is conventionally tried in a batch protocol and which is eventually transformed into a flow synthesis approach actually needs more involvement and deeper understanding of engineering aspects for the desired performance. Flow Chemistry is a combination of several components from chemical synthesis and different engineering fields with mutual benefit. Although the activities in the individual disciplines are silos among neighboring fields, the already existing tiny bridges have to be broaden to cross to the other disciplines so as to

see the flow chemistry moving from proof of the concept to actual commercial production in flow.

In the current special issue, the chemical engineering aspects of flow chemistry are highlighted and discussed in detail to close some gaps. By and large many of these topics are often not seen together making this issue very special. Examples of these small and larger bridges between the different but also similar disciplines and research areas are highlighted. The overall composition exemplifies key engineering principles that modern flow reactors build on.

This special issue covers with full research papers and short communications on the following distinct parts. *Multi- and single-phase flows, mixing and dispersion* cover aspects of transport phenomena and mixing as well as solids handling in flow. This includes single-phase and multiphase mixing, dispersion, emulsification, and residence time distributions for selectivity engineering. *Flow reactors and processes* are based on reaction engineering with modelling, reactor design, alternative energy input, scale-up, novel devices for specialty and bulk chemistry and material synthesis described in several papers. Some are covering modern developments with 3D printed devices, catalytic reactors in Flow Chemistry with integration of homogeneous and heterogeneous, biocatalysis, photocatalysis, or electrochemical catalysis. With *Process systems engineering* approaches, integrated processes with separation and purification steps, automation and robotics including process control dynamics, library screening, high throughput experimentation, or self-optimization are combined with integrated measurement techniques.

The demographic distribution of the manuscripts in this issue does not represent the actual demographic distribution of the work being done in the domain of Flow Chemistry across different continents, but probably mirrors the pandemic situation and missing conferences or contact events. Although this issue has contributions of typical chemical reactions and related equipment, flow phenomena, thermodynamics and CFD modelling, see the Figure at the end of this editorial, we couldn't cover the entire area including economics of continuous processes, novel PAT tools for

✉ Norbert Kockmann
norbert.kockmann@tu-dortmund.de

Ryan Hartman
ryan.hartman@nyu.edu

Amol Kulkarni
aa.kulkarni@ncl.res.in

¹ Biochemical and Chemical Engineering, Equipment Design, TU Dortmund University, Dortmund, Germany

² Department of Chemical and Biomolecular Engineering, New York University, Brooklyn, NY, USA

³ Chemical Engineering & Process Development Division, CSIR-National Chemical Laboratory and Academy of Scientific and Innovative Research (AcSIR), CSIR-National Chemical Laboratory (NCL) Campus, Pune, India

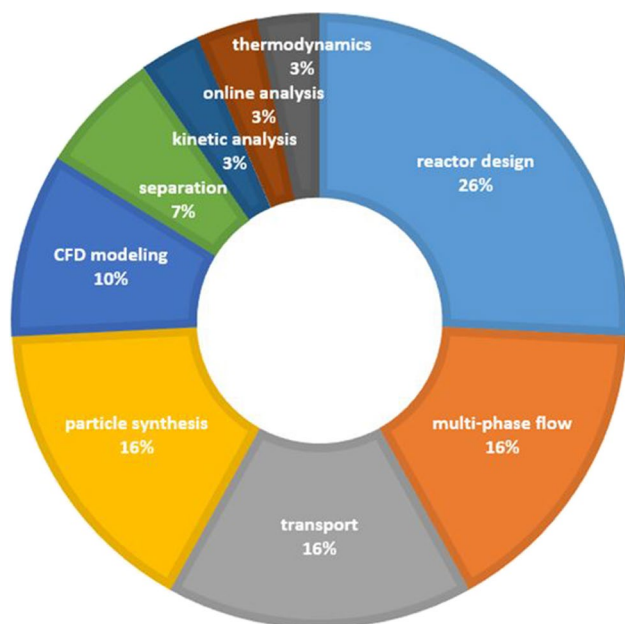


Figure: Distribution of different topics in this Special Issue of Engineering Aspects in Flow Chemistry.

process analytics, or current industrial applications. As the field evolves, we will definitely have contributions from these domains covered in the near future.

In all, we feel that this Special Issue will help bringing more chemists and chemical engineers work together with a common understanding and develop sustainable processes. Flow synthesis is considered as the future of chemical production and this journal will play a pivotal role in realizing it.

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