Preface

In the last decade, the field of flow chemistry has advanced tremendously and a plethora of applications have been reported in different fields at an unparalleled speed. The characteristics of flow reactors are their exceptionally fast heat and mass transfer. Using so-called microreactors, virtually instantaneous mixing can be achieved for all but the fastest reactions. Similarly, the accumulation of heat, formation of hot spots, and dangers of thermal runaways can be prevented. As a result of the small reactor volumes, the overall safety of the process is significantly improved, even when harsh reaction conditions are used. Thus, this technology offers a unique way to perform ultrafast, exothermic reactions, and allows the execution of reactions which proceed via highly unstable or even explosive intermediates. In addition, efficient telescoping of reaction sequences can be beneficial in terms of minimizing the number of unit operations and avoiding intermediate isolations, which are of particular interest to the pharmaceutical industry where complex multistep sequences often need to be performed. In contrast to what existed only a few years ago, the flow chemistry literature is now full of publications from not only academic groups but also from scientists working in the industry reporting the results of their many different research activities in this field.

Despite the fact that there appears to be ample literature in the flow chemistry space – including several extensive monographs, books, and highly cited review articles – there is a lack of suitable textbooks that can be used for teaching purposes and that can explain the fundamentals to newcomers to the field. A complaint often heard from companies is that there are not enough scientists with the unique training and skillsets of a flow chemist, that is, a person having been educated at the interface of synthetic chemistry and chemical engineering, with additional expertise – for example – in analytical chemistry and data-rich experimentation/machine learning. The first edition of the present *Graduate Textbook on Flow Chemistry* published in 2014 was, therefore, a highly welcome and urgently needed addition to the steadily growing flow chemistry literature! Now, several years on, the second edition of this textbook is released. The original format has been kept the same, namely, a separation into two independent volumes, one dealing with fundamentals, and a second volume, more relating to the many diverse applications that can be realized with this enabling technique. Both volumes not only discuss basic theory but also leave ample room for discussing practical considerations. The individual 22 chapters have been authored by experts in their respective fields, wisely chosen by the editors of this textbook, now – in addition to the original editorial team (Ferenc Darvas, Volker Hessel and György Dormán) – also including Steven Ley.

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It is my hope and genuine expectation that the second edition of this *Graduate Textbook on Flow Chemistry* will become the standard reference work in the field, both at the university level and at other research institutions, where scientists have to get familiar with this rapidly developing field.

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