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Preface

The success of the 9th edition of the international conference series on microreaction technology (IMRET 9) is a strong evidence for the continued increasing interest in these innovative approaches to reaction and process design. At IMRET 9, the latest research and development results in reaction and process engineering for microreaction technology were presented to a diversified audience of participants from over 40 countries from around the world. The large number and wide variety of industrial participants at the conference, as well as the substantial number of industrial presentations on manufacturing of microstructured devices and their application in pilot and production plants, illustrate the increasing interest of industry for the field.

An examination of the conference contributions highlights three major observable trends: (1) Microreaction technology has now gone beyond a purely exploratory phase in its search for an established position as an important process technology. Studies of technical feasibility of the technologies represented at IMRET from an engineering perspective are increasingly present in economically meaningful ranges of reactor conversions and production regimes, thereby strengthening industrial interest in targeted application of microtechnological solutions in practice. Consideration of multiscale approaches to whole-process design and synthesis is increasingly emphasised. (2) Scientific research itself, as presented at IMRET, has now moved from pure gas and liquid phases to take up the challenges of numerous complex fluid systems. High-viscosity fluids in polymerisation and solid-state nanoparticle synthesis are today an integral part of the research addressed in microreaction technology. (3) Following initial emphasis on microstructuring of process units and phenomenological testing of various reaction systems, research is now revisiting scale effects in heat- and mass-transfer processes and their interactions with surface effects. It has now become evident that numerous phenomena are not yet fully understood and that new fundamental research is required.

Critical examination of performance enhancement and disappointing results in some cases, in particular in the areas of scale-up and economic feasibility, have given rise to new challenges and to the need for interdisciplinary research. For example, while the design of a wide variety of microstructured devices for intensified heat transfer processes has been mastered, and the introduction of catalyst material into structured devices has been made possible, it is now the performance of the catalyst itself that has become the major bottleneck. Further progress will require order-of-magnitude increases in catalyst activity in order for the true potential of microstructured reactors for economically feasible process application to be achieved.

The increasingly focused discussions and precise definition of the contours of microreaction technology offer the opportunity for targeted research and development as well as effective dissemination and industrial application. From this solid foundation, IMRET 9 has created the basis for a new era in microreaction technology. A very positive sign is the combined organisation of IMRET 9 with ISCRE 19, the 19th international symposium on chemical reaction engineering. Participants at both conferences experienced IMRET 9 as an innovative forum that extends classical reaction engineering, offers new perspectives for research and opens new pathways for challenging scientific and technological development.

In conclusion, IMRET 9 represents a major milestone in the development of microreaction technology as an essential element in the toolkit of technologies for effective chemical reaction engineering.

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