Flow Chemistry in Europe

Given the considerable success of previous special issues from colleagues in North America and in Asia, it is appropriate to also provide a similar collection of work from Europe, hence this new compilation of reviews and publications in the area. It is very clear that flow chemistry and continuous processing methods are impacting on an increasingly wide community as more practitioners master the necessary skillset and learn to integrate the technologies with existing batch methods. Also, as more people enter the field, we recognise new opportunities and novel process windows which go well beyond the traditionally accepted advantages of flow chemistry, such as improved mixing and heat-mass transfer. The desire to protect the human resource from labour intensive processes and drive toward more sustainable chemical synthesis underpins our modern approach to molecular assembly. As in the whole of society, we are increasingly reliant on machinery; our laboratories are changing rapidly. So too is our science and many of the dogmas of the past are being challenged and we are seeing novel chemical reactivity leading to undreamt of opportunities for the construction of functional materials. Improved downstream processing, telescoped reaction sequences and flexible manufacturing protocols are driving a new agenda. Accordingly, the United Nations in 2016 delivered the so-called "17 Sustainable Development Goals", which promote our continued application of the principles of Green Chemistry, also highlighting the vital need to engage the concepts of green engineering to radically improve process intensification for the betterment and sustainability of the planet.

Improved understanding of the physical form in terms of size and aggregation and its effect particularly in catalytic reactions is also very notable. So too are we recognising that compartmentalisation, translocation and dynamics of flow can have profound outcomes. Indeed, the articles and reviews in this special issue give us considerable enthusiasm that the area continues to stimulate innovation across a wide range of topics, for example in developing photo- or electro-chemical activation methods in flow and handling potentially hazardous materials. Larger scale processing, reaction control and optimisation strategies also feature predominantly along with a number of multistep sequences often using solid phase reagents and scavengers. Likewise, equipment continues to evolve to extend the reactivity profile, particularly the scale, and solve problems arising from multiple down-stream unit operations. This is an area where continued development is necessary, especially its integration with batch methodology to provide a much more holistic (systems) approach to synthesis. Inevitably

enhanced computational capability, big data management and information mining will be an important part of the next generation of devices.

Other trends we can anticipate going forward will be the expansion of flow chemistry in the materials science area and the use of multi-enzyme cascades, particularly using engineered systems. We need flow chemistry to be more than an enabling tool, but one which can facilitate new reaction discovery.

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