

Manufacturing Pharmaceuticals and Fine Chemicals in Continuous Flow

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The advantages of continuous flow processing are increasingly being appreciated by the pharmaceutical industry and, thus, a growing number of scientists, from research chemists in academia to process chemists and chemical engineers in pharmaceutical companies, are now starting to employ continuous flow technologies on a more routine basis. Owing to the small reactor volumes, the overall safety of the process is significantly improved, even when harsh reaction conditions are applied. Thus, microreactor technology offers a unique way to perform ultrafast, exothermic reactions, and allows the execution of chemistries which proceed via highly unstable or even explosive intermediates.¹

In this lecture, we will argue that a successful switch from batch to flow requires a change of mindset (thinking outside of the box, Figure 1) and a degree of process innovation not commonly found in the community. Specifically we believe that a strong interplay of process simplification, process intensification and process integration is required where the capabilities of flow technology are considered right from the beginning in developing the chemistry.



Figure 1. Thinking outside of the “batch” box.

¹ Gutmann, G.; Cantillo, D.; Kappe, C. O. *Angew. Chem. Int. Ed.* **2015**, *54*, 6688.