Accelerated discovery and development of functionalised block copolymers using continuous-flow anionic polymerisation platforms

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Anionic polymerisation is an industrially established method of synthesising polymers with defined molecular weights and architectures. This includes the formation of block copolymers, which form advanced nanomaterials with highly desirable properties. Unfortunately, anionic polymerisation for the formation of block copolymers is a synthetically challenging process meaning it is difficult to conduct efficient optimization of parameters and product composition. Streamlining this overall process would therefore be highly desirable both industrially and academically since it could provide affordable new advanced and sustainable polymers .

This project aims to develop new and user friendly techniques for high-throughput, rapid proto-typing and optimisation of anionic copolymerisation and polymer functionalization. The experimental approach will involve adapting continuous-flow reactors equipped with online monitoring and computational control interfaces to the anionic polymerisation process. These reactors would then enable rapid optimization of conditions and prototyping of polymers

The student will first be trained in anionic polymerisation at the University of Durham within Prof Lian Hutchings laboratories. They will then move to Leeds where they will work within Dr Nick Warren's laboratories which is part of both the Colloid and Polymer Engineering and Digital Manufacturing and emerging technology groups. Here, they will build reactors which are capable of anionic polymerisation and exploit them for rapid prototyping of polymerisation systems

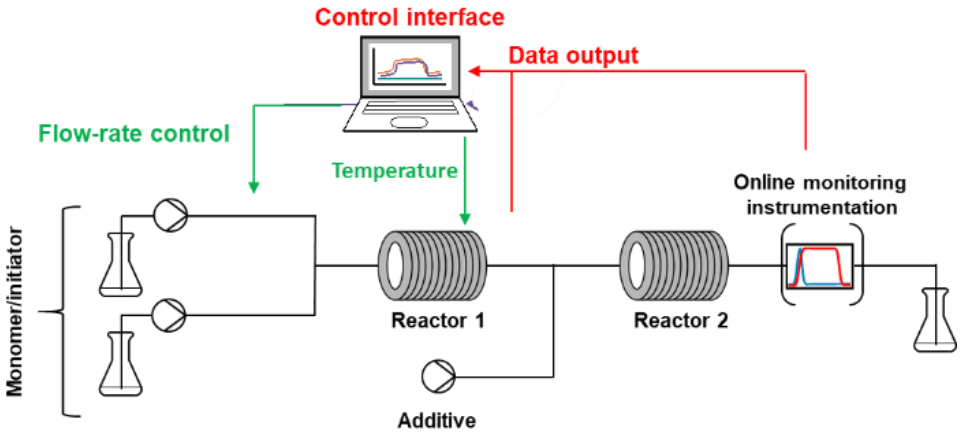

Figure 1. Schematic representation of an automated flow reactor.