High Efficiency Microwave Flow Towards Synthesis of Fine Chemicals, Functional Materials and Pharmaceutical Cores

Abstract: Microwave heating benefits organic synthesis by affording higher product yields in shorter time periods than conventional heating, yet suffers from poor scalability and is limited to polar solvents in typical batch mode reactors. Herein, we report a novel microwave flow reactor capable of tunable, single-mode heating which allows high efficiency, scalable organic synthesis, rapid reaction optimisation and is applicable to non-polar solvents. Several applications will be presented.1-6 This technology unlocked unprecedented g/h productivity of C60/fullerene-indene monoadducts (IC60MA)7 and facilitated a novel, transition metal-free amide-styrene coupling reaction for synthesis of amide-containing pharmaceutical cores in up to 65 g/h.8

Figure 1. Microwave flow synthesis of functional materials and pharmaceutical cores.


Biography

Joshua P. Barham received his industry-based Ph.D. in 2017 under the supervision of Prof. John A. Murphy at the University of Strathclyde and Dr. Matthew P. John. at GlaxoSmithKline, U.K. where he explored innovative methods for sustainable pharmaceutical manufacture, including photo- and flow chemistry, within the process chemistry department. He supported several drug discovery programmes transition reactions from batch to flow. He has since worked as a NEDO and JSPS research fellow in AIST, Japan specialising in photochemistry and microwave flow chemistry in organic synthesis.