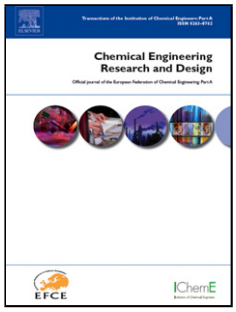

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The application of an electrochemical microflow reactor for the electrosynthetic aldol reaction of acetone to diacetone alcohol

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Highlights

- A modular micro-fluidic electrochemical reactor setup is constructed and employed.
- An electro-organic synthesis with the solvent as reactant is performed.
- The effect of channel design and velocity profile on the mass transfer is described.
- The laminar flow is exploited to separate highly reactive electrogenerated species.

Abstract

The design and application of an electrochemical micro-flow reactor for the aldol reaction of acetone to diacetone alcohol (DAA) is reported. The modular reactor could be readily disassembled and reassembled to change the electrodes, incorporate a membrane and remove possible obstructions. The productivity and efficiency was quantified. Using a platinum deposit as electrocatalyst or an inert glassy carbon electrode as working electrode, the maximum obtainable equilibrium concentration of ±15 m% was reached after a single pass up to a flow rate of 8 ml min^{-1}, yielding 0.57 g min^{-1} DAA (3.46 mmol cm^{-3} min^{-1}) at an efficiency of 0.33 g C^{-1} on platinum and 0.50 g min^{-1} (3.04 mmol cm^{-3} min^{-1}) at 1.20 g C^{-1} on glassy carbon. Note that no optimisation studies have been made in the present paper.