

Microfluidic system for synthesis of submicron vaterite drug carriers

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Micron-sized particles of calcium carbonate in the form of vaterite are widely employed as a drug carrier. Calcium carbonate exhibit a complex polymorphic behaviour which depends on many factors and still poorly characterised. Here, we employ a segmented-flow microfluidic chip in order to provide synthesis of calcium carbonate with a highly controlled size and polymorphic composition and compare results with conventional bulk methods. Mixing of equal volumes of equimolar aqueous solutions of calcium chloride and sodium carbonate on the picoliter scale was shown to enable synthesis of pure vaterite with low size distribution. In contrast, the calcium carbonate precipitated in the bulk conditions usually represented by a mixture of calcite and vaterite and exhibited a broad distribution over sizes for all reaction conditions investigated.

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