Precipitation in a microchannel

Project leaders
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Research theme
Complex dynamics of fluids

Participants
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Cooperations
API-TUD

Funded
DC-SIP, JMBC Burgerscentrum, Microned
1st 100% 2nd - 3rd -

Start of the project
2005

Information
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Project aim

The aim of the project is to implement a chemical reactor on a microscale device. The process is an anti-solvent precipitation reaction which is a model for more complex chemical processes in industry that involve toxic components or exothermic reactions. The objective is to control the process and to integrate transport, mixing and separation on a single microfluidic device.

Progress

In microfluidics the channel geometry is often not circular or square due to the manufacturing difficulties associated with the small scales. In differently shaped channels the spreading of precipitate is different than expected based on theory. Therefore effort has been put on how a stack of precipitate (simulated by a sample plug of fluid) moves through an arbitrary shaped microchannel. A model for the dispersion has been developed for pressure-driven and electroosmotic flow and successfully tested both experimentally and numerically. From the theory also a minimum dispersion velocity for any arbitrary shaped channel can be determined, which is of importance for example DNA-sampling in microdevices.

Dissertations

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Scientific publications

1. V.H.J. Nieborg, A.P. Markesteijn, R.H. Lindken, G.J. Witkamp, H.J.M. Kramer "Mixing with EOF for a precipitation reaction" J. Disper. Sci. Technol. 29 (2008) 587-592.
2. 1st International Conference on Industrial Processes for Nano and Micro Products, London, UK, 3-4 April 2007. 1st European Conference on Microfluidics 2008, Bologna, Italy, 10-12 December 2008.