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A STUDY OF MICROFLUIDICS CHIP AND ION MOBILITY SPECTROMETRY

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Abstract

`Microfluidics deals with the behavior, precise control and manipulation of fluids that are geometrically constrained to a small, typically sub-millimeter, scale. Typically, **micro** means one of the following features:

- small volumes (nl, pl, fl)
- small size
- low energy consumption
- effects of the micro domain

It is a multidisciplinary field intersecting engineering, physics, chemistry, micro technology and biotechnology, with practical applications to the design of systems in which such small volumes of fluids will be used. Microfluidics emerged in the beginning of the 1980s and is used in the development of inkjet printheads, DNA chips, lab-on-a-chip technology, micro-propulsion, and micro-thermal technologies. The behavior of fluids at the microscale can differ from 'macrofluidic' behavior in that factors such as surface tension, energy dissipation, and fluidic resistance start to dominate the system. Microfluidics studies how these behaviors change, and how they can be worked around, or exploited for new uses. At small scales (channel diameters of around 100 nanometers to several hundred micrometers) some interesting and sometimes unintuitive properties appear. In particular, the Reynolds number (which compares the effect of momentum of a fluid to the effect of viscosity) can become very low. A key consequence of this is that fluids, when side-by-side, do not necessarily mix in the traditional sense; molecular transport between them must often be through diffusion. High specificity of chemical and physical properties (concentration, pH, temperature, shear force, etc.) can also be ensured resulting in more uniform reaction conditions and higher grade products in single and multi-step reactions