MICROFABRICATED FLUIDIC DEVICES FOR BIOCHEMICAL ASSAYS

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Advances in sensor technology can further improve the quality of life in the 21st century. This is especially true in the area of chemical analyses where smaller, faster and cheaper devices and more reliable and accurate results would have profound consequences in fields such as medical diagnostics, environmental science, and forensic analysis. The development of microfabricated fluidic devices over the last decade have the potential to provide such advances as they are compact and many chemical processing and analysis steps can be combined either serially or in parallel onto them. The ability to fabricate structures with interconnecting channels that have essentially no dead volume contribute to the high performance and great flexibility of these devices. To carry out a complete assay, many different kinds of functional elements can be designed and serially integrated on microchips. These elements include filters, valves, pumps, mixers, reactors, separators, cytometers, and detectors, and their operation can be easily coupled together under computer control. One area of particular interest is the analysis of cells and cell populations, but to date only a few examples of cell transport, sorting or analysis on microfluidic devices have appeared. We are developing microfabricated fluidic devices to perform various biochemical analyses on cells. We will demonstrate and discuss the transport and manipulation of cells on microfabricated devices along with methods for the analysis of cellular contents.

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