Microfabricated Devices for the Acquisition of Chemical and Biochemical Information

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The ability to sculpt microscopic features into planar solid state substrates emerged as a discipline known as micromachining in the late 1970's. Micromachining is a spin-off from the microelectronics industry and thus uses similar principles for construction of physical features. Microfabrication capabilities have continued to grow over the past two decades producing many intriguing actuator assemblies including miniature motors, tweezers, accelerometers, and pressure sensors. There has also been increasing interest in microscale chemical synthesis and analysis procedures over the past few decades. Most of these efforts have employed manual procedures coupled to large-scale instruments that can address small samples. Efforts over the past several years suggest that micromachining technology can be utilized to fabricate devices that yield useful chemical and biochemical information rapidly from increasingly smaller samples. Realization of these micro-laboratory components could allow a paradigm shift for chemical and biochemical synthesis and analysis similar to that provided to electronics by the transistor and integrated circuit. There are a large number of applications were small inexpensive devices that provide chemical information will be useful. These applications include chemical sensing and field measurements for environmental monitoring and process control, and clinical diagnostics, DNA sequencing, proteomics, and combinatorial library screening in the health care industries. An overview of microfabricated chemical and biochemical measurement devices will be presented.

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