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MINIATURIZED ANALYTICAL SYSTEMS: HOW WIDE - HOW DEEP?

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Truly miniaturized chemical instrumentation and systems have been discussed for a quarter of a century. The first such device was a microfabricated gas chromatograph that was fabricated on a 5-cm diameter silicon wafer. While this work was seminal to the area it did not deliver a miniature device with performance commensurate with laboratory scale instrumentation and hence scientific and commercial interest in these devices has waned. In contrast, the past decade has seen interest in microfabricated fluidic systems grow tremendously. These miniaturized fluidic systems have more closely paralleled the benefits we have realized in the miniaturization of microelectronics, i.e., small, low cost devices that deliver *increasing* performance. Microfluidic systems have shown the ability to integrate chemical processing and reactions with chemical analysis. The results have been automated systems that process picoliter scale volumes with high performance. Such systems have applicability to a broad scope of chemical and biochemical measurement problems such as in-situ monitoring, field analysis, clinical diagnostics, and high-throughput experimentation. Success in microfluidics devices has renewed interest in miniaturization of other chemical measurement technology such as mass spectrometry, NMR, and ion mobility spectrometry. Prospects for the field of miniature chemical systems will be discussed.

Research sponsored by Office of Research and Development, U.S. Department of Energy, under Contract DE-AC05-00OR22725 with Oak Ridge National Laboratory, managed and operated by UT-Battelle, LLC.