

Lab-on-a-Chip Devices for Performing Chemical Assays

Stephen C. Jacobson, Christopher T. Culbertson, Maxine A. McClain, Jean Pierre Alarie, and J. Michael Ramsey. Oak Ridge National Laboratory, Oak Ridge, TN 37831-6142

Interest in microfabricated instrumentation for chemical sensing and analysis has grown considerably over the past decade primarily because these miniature instruments have the potential to provide information rapidly and reliably at low cost. For liquid phase analysis, microfabricated fluidic devices constructed on planar substrates can be advantageous for manipulating small sample volumes, rapidly processing materials, and integrating sample pretreatment and separation strategies. To carry out a complete assay, functional elements can be serially integrated on these devices with interconnecting channels having minimal dead volume, and fluidic manipulations in and between elements can be automated under computer control. The design, fabrication, and testing of microfluidic devices for chemical reactions, separations, and cell assays 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.