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A GCxGC Design for Fieldable Microfabricated Gas Analyzers

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This presentation will describe Sandia's efforts to develop gas chromatography (GC) based fieldable analyzers. Early designs have been successfully applied for toxic vapor detection with low false alarm rates, even though GC separation capacity is rather modest, by limiting the range of target analytes through use of chemically selective sample preconcentration and detection. More recent efforts have concentrated on maximizing chromatographic separation capacity per unit time, through development of microfabricated, pressure-modulated two dimensional comprehensive gas chromatography (GCxGC) systems. A key point is that fast GC requires fast sample injection. In laboratory separations fast sample injection can be achieved through the use of creative sample-splitting methods. However, trace analyses in field operations cannot afford to "throw away" collected sample mass without seriously compromising overall detection sensitivity. This problem, in turn, has motivated our effort to develop a series of microfabricated sample collection and injection valves to enable high-speed GC injection while maintaining low sample split ratios. Performance of microfabricated GC and valve components will be presented along with some representative results from high-speed GCxGC separations.

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