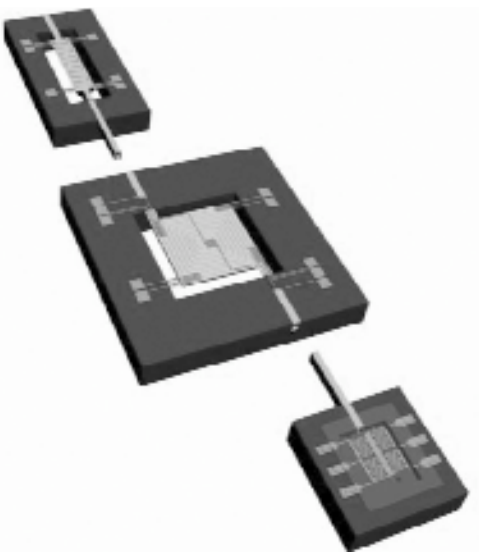
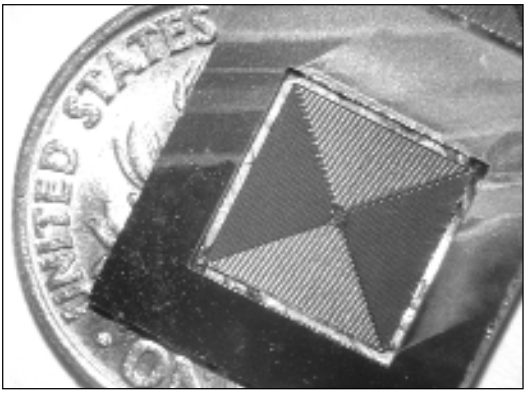
A Low-Volume, Low-Power Preconcentration and Gas Separation System

Katharine Beach and Kensall D. Wise



The "ORION" gas separation/analysis system, consisting of a preconcentrator, a dielectrically isolated separation column, and a multi-element detector.

This project is developing the next-generation gas separation/analysis system for the WIMS μGC. The three-chip microsystem, dubbed "ORION," is being designed to minimize mass to permit high-speed temperature programming and is thermally isolated for very low operating power. The chips plug directly together to eliminate any external tubing, avoiding the cold-spots, dead volumes, and band broadening it can cause. The three chips form a modular low-power, high-speed separation system, several of which can be operated in parallel and independently temperature-programmed for the high-resolution analysis of gaseous mixtures. The new preconcentrator has been designed to allow adsorbent loading after chip sealing and release. The preconcentrator and separation column use single-crystal silicon walls, are sealed using CVD dielectrics, and are thermally isolated on dielectric membranes. This project is supported by the Engineering Research Centers Program of the National Science Foundation under award number EEC-9986866.



A low-power CVD-sealed separation column with boron-doped silicon walls on a dime.