

## 4.2 CONNECTIONS BETWEEN DISCOVERIES AND THEIR USE IN SERVICE TO SOCIETY

### 4.2.1 A MODULAR MICROFLUIDIC ARCHITECTURE FOR INTEGRATED BIOCHEMICAL ANALYSIS

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To develop a useful chip-based detection system, high-throughput chip manufacturing methods must be developed. NU-NSEC researchers have recently developed a system-level architecture to rapidly build custom microfluidic systems. Micro valves, pumps, sensors, mixers, and other components are integrated on a silicon chip with through-wafer holes (the microfluidic breadboard, or FBB). A functional system is realized by connecting these isolated components with microfluidic channels on the opposite side of the chip. The channels are formed in polydimethylsiloxane (PDMS) via a relatively simple and inexpensive molding technique. By standardizing the FBB, new system functionality can be achieved simply by creating a new PDMS chip. This greatly simplifies the design and fabrication of custom microfluidic systems. The bio-barcode protocol for detecting prostate-specific antigen (PSA) was successfully implemented on the FBB system, leading the way for eventual automation of the assay.

