Orbital Research Inc.

MEMS MicroValve Arrays

LOW-POWER MICRO VALVES FOR PRECISION MICRO-FLUIDIC CONTROL

Orbital Research has developed innovative low-power, fast acting, and low-cost advanced controls and Micro-Electro-Mechanical System (MEMS) micro-valve technology that provides precise means to control micro-fluids for a broad rage of applications. Orbital Research uses MEMS fabrication techniques to manufacture custom tailored microvalves. These microvalves are conveniently and densely packed in cassettes which provide individually controlled outlet ports and operated via a PC using drive electronics and control-software also developed by Orbital Research (Figure 1 & 2).

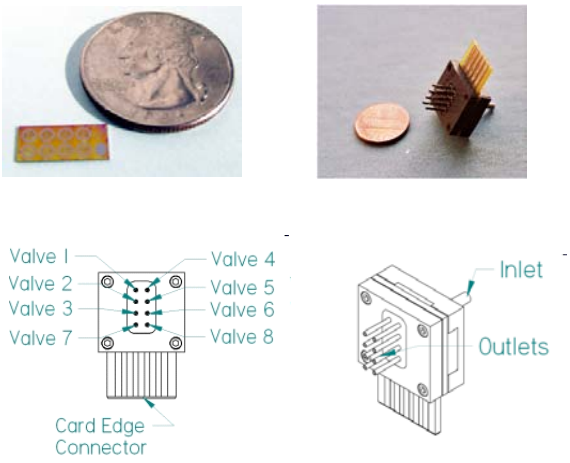

Figure 1. Top-left: photograph of die containing eight microvalves; top-right: photograph of assembled and packed eight-microvalve system; bottom-left: back view of package showing valve output port assignments; bottom-right: orthogonal view of package.

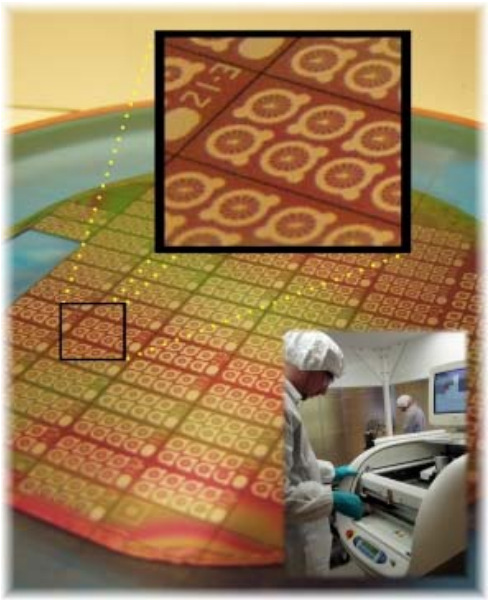

Figure 2. Photograph of microvalves

Some of our microvalves applications include:

Refreshable Braille Display System

Orbital Research is developing a revolutionary cost-effective solution for the visually impaired individuals to access computer/electronic based information (Figure 3a). Orbital Research's technology utilizes MEMS based micro-valve technology to create an 8-dot multiple-lines refreshable Braille display. We have developed technology that leads to affordable screen interface displays with increased performance and versatility.

Massively Parallel BioChip Systems

Orbital Research is developing densely packed Microfluidic actuator arrays (Figure 3b) to precisely meter small doses of reagents and optimize the fluid handling and performance of massively parallel oligonucleotide and peptide library synthesis systems. Our technology enables low cost miniaturization and the integration to a variety of techniques such as high-throughput chemical analysis, cell fusion, fraction collection, and fast sample mixing. Thus, it becomes an integral technology component that contributes to converting microfluidic chips into an economically viable and more accessible research tool.

Respiratory Drug Delivery System

This novel system is being developed (in conjunction with iACTIV) to have the capability to precisely control dosing and delivery of the drugs in order to increase the effectiveness in respiratory therapy. A micro-valve array integrated into a drug reservoir replaces the conventional atomization systems. The ability to manage particle size is a strong attribute for SARS, Oncology, and other drugs that are highly toxic and expensive.

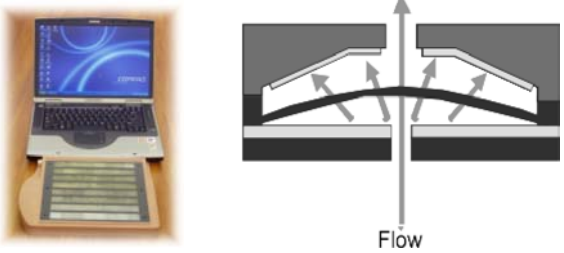

Figure 3a & 3b. Left (Figure 3a): refreshable multi-line Braille display system; right (Figure 3b) : Microfluidic controller with bidirectional flow capability

Orbital Research has licensed the microvalve technology to iACTIV Corporation (www.iACTIVcorp.com) which is currently the manufacturer and supplier of these MEMS microvalves.

Orbital Research develops and commercializes new and innovative custom-engineered solutions in advanced controls and micro-devices for various commercial and military applications. We offer solutions that target to improve performance and functionality, and decrease cost-of ownership and manpower reduction needs.

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