

Press Release

Bartels Mikrotechnik at Hannover Messe, Hall 15 – Booth D36

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Logical Establishment of a Micropump Family

The striking characteristics of the micropump that Bartels Mikrotechnik first presented in 2004 were its tiny dimensions, its high pumping dynamics, and its capability for pumping gases and liquids. Developed as a low-cost product for the mass market, the logical further development is now following in the form of the adaptation for the application-specific requirements of the market. The first version of the micropump laid the foundation stone for the establishment of a family of products and for marketing to a wide variety of industries. So far, two patents have been applied for to protect the product and three more applications are being prepared in connection with the additions to the product family.

In addition to developments on a stroke-limited pump for high throughput precision and low flow rates, and the construction of a controlled system for use in various fields of medical technology, another particular focus lies on the use of these pumps in miniaturised fuel cells.

Because of its tiny dimensions and low power consumption, the pump is of great interest for portable systems. Portable electronic equipment such as mobile phones, laptops, digital organisers, and industrial sensors with an independent energy supply require new concepts in energy supply because the performance that is being required of them is rising all the time. Miniaturised fuel cells are currently being developed to ensure that such systems can operate reliably. In fuel cells such as the Direct Methanol Fuel Cell (DMFC), for instance, micropumps are needed as the supply system for methanol and air.

The most important requirements for micropumps in this context are not only low power consumption but also, and in particular, counter-



Small but smart: Serial produced micropumps like this one offer flow rates of 50 nl/min to 5ml/min. Produced in high volumes, it becomes absolute low in price and is due to this predestinated for disposable use.

Source: Bartels Mikrotechnik GmbH

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pressure stability, caused solely by the pressure differentials resulting from the operating temperature of the system and the level of fill in the reservoir, as well as from the requirements for rates of flow specific to the various fuel cells. In order to exercise control over the necessary streams of fluid, Bartels Mikrotechnik is currently developing a coupled system consisting of a pump with an integral valve.

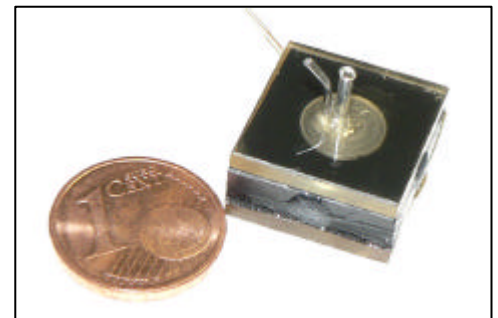
The active valve will be presented at the *Microtechnology* as a stand-alone component. The valve is designed along the same lines as the pump, with the aim of ensuring that the later system is identical in its lateral dimensions and thus only differs in height. The micro-valve is likewise available to potential customers as a stand-alone component and as a further element in the micro-assembly kit of fluidic components based on polymers.

About Bartels Mikrotechnik

Next to the technological know-how, the long time experience in micro systems technology and the powerful affiliate network, the combination of MEMS solutions centre, excimer laser jobshop and own products defines the unique selling proposition of Bartels Mikrotechnik GmbH. At the Microtechnology in Hannover the creative competence of the company and innovation potential of micro systems technology is presented through customer specific microfluidic products and own products as micropump and microvalves.

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Small and smart: Active micro valve
The first prototypes will be presented at Hannover Fair 2006.

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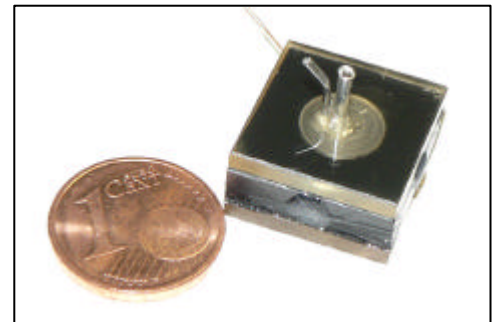
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Extended Portfolio of Microfluidic Components

The product portfolio of microfluidic components by Bartels Mikrotechnik is extended by an active micro valve next to the so far existing passive dynamic micro check valve and piezo membrane pump. At Hannover fair the first prototype will be presented. The functional principle is based, as the micropump, on a piezo membrane. Otherwise the set-up is made of plastic to be able to produce in series at low-price. The valve is normally closed and closing pressures of 0,5 bar are achieved. The valve can be operated stand-alone or modular in combination with the micropump. After an iteration phase the transfer into serial production is aimed for 2007.



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Fluid Transport with Electro-Wetting

In the field of active liquid transport, Bartels Mikrotechnik further extended its competence last year with technological development work in fluid manipulation with electro-wetting. The fields of use of electro-wetting lie in the production of highly integrated microfluidic applications such as the “lab on a chip”, in which the controlled manipulation of tiny volumes of fluid is necessary.

Applying the principle of electro-wetting means using electric fields to control the surface tension of conductive or polarised liquids. Extremely small drops of liquid can thus be moved through suitably structured electrodes with a high dynamic level.

The electrodes consist of a wide variety of materials such as gold or indium-pewter oxide. The flexibility of the excimer laser structuring, of which the firm of Bartels Mikrotechnik is such a master, enables a wide variety of designs to be produced by the rapid-prototyping technique and successfully tested and optimised for the application. In this way, after the surface phobic treatment of the substrate, liquids can be transported onto the chip surface systematically and without any prescribed channel systems. It is of course possible to combine this transportation technology to outstandingly good effect with the creation of fluidic geometries such as channels, filters, and nozzle structures. Here again laser structuring is the ideal tool and, in combination with the established joining process, leads to the possibility of constructing complex and highly integrated active systems.

In addition to the “lab on a chip” application that has just been mentioned, other innovative areas of use are envisaged in micro-optics, display technology, and in the field of “smart living”.



Sequence of liquid movement with electro-wetting.

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The activities of Bartels Mikrotechnik, which in the field of active liquid transport initially related to the piezo-membrane micropump launched onto the market in 2004, is now being logically augmented with the new technology. The micropump is still as topical as ever, and its distinguishing features are its tiny dimensions, its high pumping dynamics, and its potential use for transporting gases and liquids that have to be pumped in relatively large quantities.

About Bartels Mikrotechnik

Bartels Mikrotechnik is providing innovative technologies and product solutions spanning various branches from its MEMS background. Next to the technological know-how, the long time experience in micro systems technology and the powerful affiliate network, the combination of MEMS solutions centre, excimer laser jobshop and own products defines the unique selling proposition of Bartels Mikrotechnik GmbH. At the Microtechnology in Hannover the creative competence of the company and innovation potential of micro systems technology is presented through customer specific microfluidic products and own products as micropump and microvalves.

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