

Members' Profiles

Yokogawa Electric Corporation

1. MEMS technology efforts at Yokogawa

Measurement, control and information are the core technology areas of Yokogawa, which provides state-of-the-art "mother tools" for an industrial world. Our major business areas are the control equipment field, which is expanding due to rising oil prices, and the measurement equipment field that comprises semiconductor testers and electronic instruments. In 2005, Yokogawa celebrated its 90th anniversary, and the Corporate Research and Development Headquarters is hard at work developing leading-edge technologies to solve customer problems in anticipation of the company's centennial in 2015. One area in which the company is focusing particular effort is the use of MEMS technology to produce key devices that can distinguish Yokogawa's products from those of its competitors. In the 20 years since Yokogawa began research into MEMS technology, the company has accumulated many basic technologies. We are now employing these technologies to develop new devices that will be the seeds for both core businesses and new businesses.

2. Current status of research and development

Some typical products and devices currently under development are described below.

(1) Silicon resonant sensor device

The key device used in the Dpharp series of process differential pressure sensors first marketed in 1991 is the miniature silicon resonant sensor shown in Fig. 1. This was one of the first products in the world to employ MEMS technology, and ultimately 1.5 million came to be used worldwide. We are increasing our share of the world market, and we feel that it is only a matter of time before we are number one globally. The Dpharp has grown to become one of Yokogawa's main products, and the company is placing a great deal of emphasis on the ongoing development of the silicon sensors that is its core component.

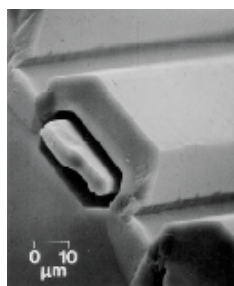


Fig. 1 Si resonant sensor

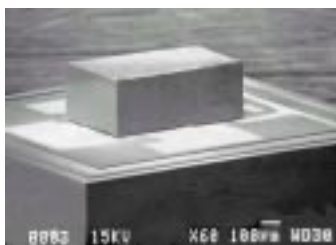


Fig. 2 Tunable MEMS-VCSEL



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(2) Tunable MEMS-VCSEL

The device shown in Fig. 2 is a tunable MEMS vertical-cavity surface-emitting laser (MEMS-VCSEL) currently being developed with the support of the NEDO High Integration Composite MEMS Fabrication Technology Development Project. Yokogawa is working to create this unique device by combining compound semiconductor technology with the Si-MEMS technology that has helped to distinguish its products from those of its competitors.

(3) Microreactor development efforts

A microreactor is a device that causes chemical reactions to take place inside a tiny micro-fluid channels. As the properties of this tiny space can be freely manipulated, manufacturing plants can be created with sizes and functions heretofore impossible. MEMS is the key technology that enables microreactors to be achieved. Microreactor technology is expected to revolutionize the manufacturing methods for pharmaceuticals and fine chemicals produced in small lots using high value added functional materials. Yokogawa is pursuing development of microreactors on a priority basis. Fig. 3 shows a microreactor chip for on-site gas manufacture, currently being developed jointly with Mitsui Chemicals, Inc.



Fig. 3 Microreactor device

3. Future efforts

MEMS is a manufacturing technology. For this reason, it is important to combine MEMS with other technologies to increase added value. In the future, Yokogawa will work to fuse MEMS with chemical technologies, deploying the achievements in microreactors, biotechnology and fuel cells.

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