

Yamatake Corporation

1. Microfabrication technology activities

With our measurement and control technology fostered over many years, Yamatake Corporation is contributing to society in the fields of building automation, advanced automation (manufacturing industry automation), and the life automation that surrounds us (automation that supports our environment and amenities). The company became involved in microfabrication technology in the early 1980s. Measurement of temperatures, humidity, pressure, and flow rates is extremely important to Yamatake, and we have given it a high priority in our research. Technologies that we developed for commercial applications from among the research themes at that time are currently the subject of further research at the Microdevice Center with the goal of expanding the application within our business. Leading edge technology domains that cannot be managed by the Microdevice Center are handled by the Research and Development Division Microsystems Group.

2. Micronano technology activities

(1) Nanocrystal silicon ultrasonic elements

ULSI technology using silicon substrates is crucial to the development of today's industry. At quantum size, the silicon expresses new optical, electronic, thermal, and chemical properties that do not appear in larger sizes. Together with the Koshida Laboratory of the Tokyo University of Agriculture and Technology, Yamatake developed a nanocrystal silicon ultrasonic element using these thermal properties. This new ultrasound source achieves flat frequency characteristics that are difficult to obtain with existing technology, and we are pursuing development to apply this characteristic to new ultrasonic speakers, high-precision range sensors, and compact actuators. Nanosilicon technology holds wide potential, and we plan to deploy this basic technology in many products.

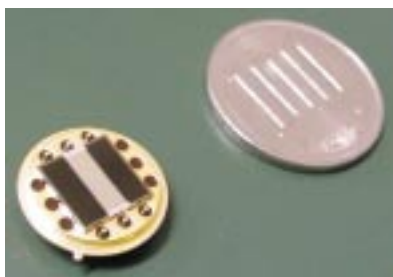


Fig. 1 A nanocrystal silicon ultrasonic element



Microsystems Group Leader, Research and Development Division
Shuichi Tanaka

(2) Spherical SAW gas sensor

The spherical SAW gas sensor uses the phenomenon in which surface acoustic waves (SAW) go around a sphere a number of times (discovered in 1999 by Professor Yamanaka of Tohoku University). This is a sensor for measuring changes in the concentration of gas on the surface of the sphere using the characteristic whereby a crystal sphere with as small as 1 mm diameter exhibits longer propagation lengths (1 m or more). This phenomenon is not seen in flat SAW devices. Since it provides high sensitivity, the sensitive membrane can be thinner allowing a high speed response. The hydrogen sensor that we are currently developing has succeeded in detecting in a wide range from extremely low concentrations (10 ppm) to high concentrations (100%). We are aiming to create a product that will offer safety and peace of mind in the coming hydrogen society. The sensor can also be made to detect other gases by changing the sensitive membrane.



Fig. 2 Spherical SAW gas sensor

3. Future activities

Nanotechnology products are the focus of attention as sensing materials. We plan to probe deeper in this area. We expect to find business possibilities in the life automation field at the end of our research. Although life automation has a different flavor from our existing business domain, we aim to expand our business in the life automation field, and make bold new advances in that area.

MICRONANO No. 56

MICRONANO is published quarterly by Micromachine Center (MMC) to promote the international exchange of information related to micromachines, R&D and other technical topics, and is circulated free of charge. Please send your comments about MICRONANO to the publisher :

Keiichi Aoyagi, Executive Director, Micromachine Center (MMC)
MBR99 Bldg., 6F., 67 Kanda Sakumagashi, Chiyoda-ku, Tokyo 101-0026, Japan
Tel : +81-3-5835-1870, Fax : +81-3-5835-1873
Internet Home Page <http://www.mmc.or.jp/>
Date of Issue : August 28, 2006