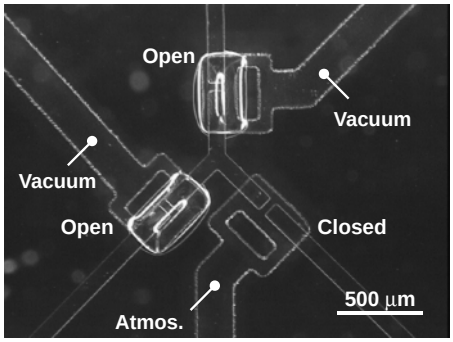
Silicone Rubber Microvalve

Micro-TAS (Micro Total Analysis Systems) are miniaturized chemical analysis instruments, and have great promise for high throughput and portability. To realize highly integrated micro-TAS, microvalves are essential for handling of samples and reagents. We have developed a three-way microvalve system composed of three independent one-way valve units. Intervals between the valve units are smaller than 780 micrometers. All the parts were made of inexpensive silicone rubber, and rapidly fabricated with molding and spin-coating.



Optical micrograph of the microvalve

Kazuo HOSOKAWA
Institute for Mechanical Systems Engineering
e-mail:
hosokawa.k@aist.go.jp
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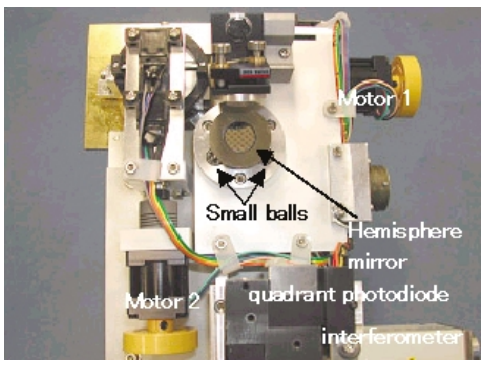
Standards and Measurement Technology

Development of a High-Accuracy Laser Tracking Interferometer System Used for Coordinate Measurement

A laser tracking interferometer system (LTS), which is capable of measuring 3-D coordinate, has been developed at AIST. The LTS makes use of the principle of laser trilateration i.e. the position of the target is determined by three lengths from three base points. Recently, we developed a compact and accurate laser tracker. The key component of the tracker is a hemispherical mirror; a hemisphere and a small sphere are connected with a rod. The plane surface of the hemisphere is mirror coated and the laser beam is reflected on the mirror. By moving the small sphere by an X-Y stage, the angle of the mirror can be changed; hence the direction of the laser beam is also changed. The hemisphere sits on three small balls, so that the center position of the hemisphere does not shift. In experiments, the mechanical error of the laser tracker is smaller than 0.5 μm. The measurement accuracy of the LTS was assessed by comparing it to a high precision coordinate measuring machine (CMM). The accuracy of our LTS was about 2~3 μm, which is much better than other commercial LTSs.

We will apply this system for calibrating CMMs (large scale or low cost) and evaluating dynamic characteristics of industrial robots.



Tracking system using a hemispherical mirror

Sonko OSAWA
Metrology Institute of Japan
e-mail:
sonko.osawa@aist.go.jp
AIST Today;
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