Members' Profiles

Nano Device and System Research, Inc.

1. Endeavors in MEMS Technology

Nano Device and System Research, Inc. (NanodeS) is a venture company that was founded on April 2, 2001 to develop commercially viable applications for MEMS. We are also planning on trying our hand at nanodevices, which are expected to be a critical technology in the 21st century. Susumu Sugiyama, the CEO of the company, has been conducting close collaborative research with Ritsumeikan University, while holding a concurrent post at the university as a professor specializing in MEMS. Ritsumeikan University possesses a synchrotron for irradiating soft X-rays to perform nanolithography. By making good use of this technology, we can develop devices with nanostructures.

2. Existing Technology

MEMS can be broadly categorized as sensors that take in signals from the environment and the like, and actuators for drive systems. Currently, development of sensors has advanced more rapidly, as they can be given functionality with a simple structure. NanodeS has also focused its development on sensors, specifically accelerometers, biosensors, and pressure sensors.

(1) Developing Applications for Existing MEMS

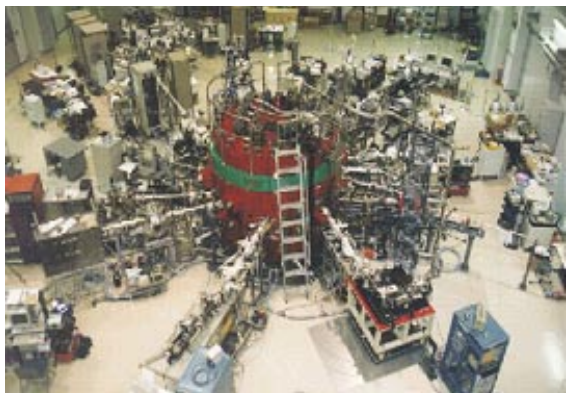
We have primarily been developing applications centered on MEMS researched at Ritsumeikan University. We are now nearing completion of a six-axis accelerometer and are currently seeking a partner for collaborative research aimed at commercializing the accelerometer. A feature of this accelerometer is its ability to perform rotational sensing, making it suitable for use in a fluid sensor or a robot arm that performs complex movements. We are striving to capture the subtle movement of humans.

The 6-axis accelerometer developed at Ritsumeikan University

(2) Developing Nanodevices

Through X-ray lithography performed with a synchrotron, we can achieve nanoprecision machining. With this technology, NanodeS is currently trying to develop a nanogap biosensor. This is a new biochip sensor that captures a single strand of DNA in the nanogap and evaluates its electrical properties when an electrical bias is applied.

Nano Device and System Research, Inc.
Yoshikazu Tobinaga, COO



The synchrotron at Ritsumeikan University has a peak wavelength of 1.5 nm

3. Future Endeavors

Optical devices are devices that use nanostructures as functions for direct expression. For example, the wavelengths of visible light fall within a range from 800 nm to 400 nm, the former extreme being the color red and the latter corresponding to blue or violet. If we can control the wavelengths at a precision of about 20 nm units, it is likely that we can use the optical properties to implement functions. In a simple example, a 500-nm hole is formed in a plate and a white light is directed on the hole. Since only light having a wavelength smaller than the diameter of the hole can pass through, the hole will appear to be colored. Microstructures are capable of coloring without pigments. In fact the colors on a butterfly's wings appear to form patterns by exactly the same method. Hence, by studying nanostructures that already exist in nature, I believe we can discover still unknown nano phenomena and use that knowledge to develop applications for nanotechnology.

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