



# TAKEUCHI-LAB.

## [Bio-hybrid micro·nano machine]

Center for International Research on MicroNano Mechatronics

<http://hybrid.iis.u-tokyo.ac.jp>

**MEMS·nano biotechnology**

Graduate School of Information Science and Technology  
Department of Life Sciences, Graduate School of Arts and Sciences,

### Implantable sensors for next-generation healthcare system



We are interested in design and fabrication of bio-hybrid systems that consist of living materials and MEMS/NEMS materials.

Since the size of proteins and cells is in nano/micro scale, they can work as functional elements in the existing MEMS/NEMS devices.

For an example, this photograph shows a mouse having the highly sensitive, biostable, long-lasting, and injectable fluorescent microbeads in its ear for in vivo continuous glucose monitoring.

We synthesized a fluorescent monomer composed of glucose-recognition sites, a fluorogenic site, spacers, and polymerization sites.

We then fabricated injectable-sized fluorescent polyacrylamide hydrogel beads with high uniformity and high throughput by using a microfluidic device.

We found that our fluorescent beads provide sufficient intensity to transdermally monitor glucose concentrations in vivo.

The fluorescence intensity successfully traced the blood glucose concentration fluctuation, indicating our method has potential uses in highly-sensitive and minimally invasive continuous blood glucose monitoring.