Biomechanical Engineering/Medical Nanosystem Engineering lab.

T. Tanaka Lab.

Dept. Biomedical Engineering / Dept. Mechanical Systems Engineering

Prof. TANAKA

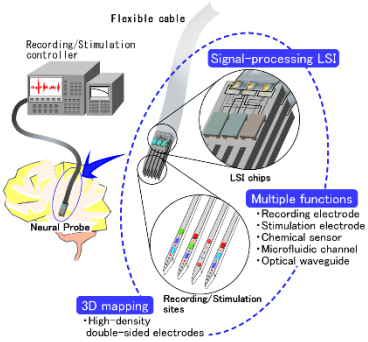
In this laboratory, you can conduct the world's most advanced manufacturing research based on semiconductor microfabrication and integration technology using various facilities in the cleanroom and laboratory. We welcome students who can proactively tackle the challenges ahead of them with logical thinking and a never-give-up spirit.

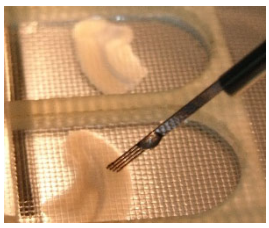
<< Career paths of recent doctoral and master's graduates >>

R3: Doctoral course 1, Sony 1, Terumo 1, Shimadzu 1, Sumibe 1, etc.
R4: Doctoral course 1, Huawei 1, Sony 1, Terumo 1, Fuji-elec 1, etc.
R5: Doctoral course 1, Postdoc(U Tokyo) 1, Japan Patent Office 1, JAXA 1, Hitachi 1, Meiden 1
R6: Doctoral course 2, Sony 1, Olympus 1, Shimadzu 1, Murata 1, etc.
R7: Doctoral course 2, Sony 3, JASM 2, Toyota China R&D Center 1, YMTC 1, etc.

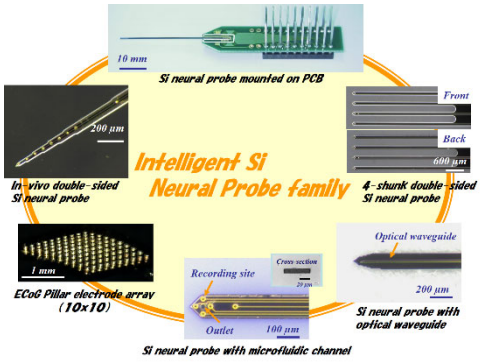
Semiconductor neural engineering is a discipline that utilizes semiconductor process, device, and circuit technologies to further understand the properties of neural systems and to create novel fusion systems of the living body and machine. One of the goals in this laboratory is to establish semiconductor neural engineering and develop integrated biomedical micro- and nano-systems. Another goal is to educate the next generation of leaders in biomedical engineering through research, including:

1. Artificial retina system for implanting into the human eye to restore vision
2. Bio-mechanical interface for manipulating (recording and stimulating) biological activities
3. Analog and digital integrated circuit design for health tech devices
4. Three-dimensional semiconductor integration technology using through-silicon vias (TSV)

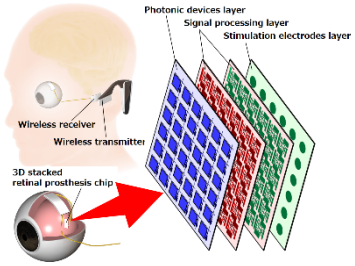


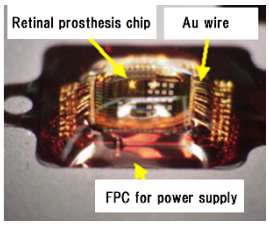


Neural probe penetrated into hippocampal slice.



【www.lbc.mech.tohoku.ac.jp】





Retinal prosthesis module for implantation into eyeball.

Intelligent neural probe

Brain-implantable intelligent neural probes can be used to analyze brain functions and aid in diagnosing brain diseases. The intelligent neural probe features various sensors, signal processing circuits, neuronal stimulation circuits, and other components. We have conducted numerous collaborative research projects with various research institutes worldwide.

Fully-implantable retinal prosthesis

More than 10 million patients have lost their vision due to eye diseases such as retinitis pigmentosa and age-related macular degeneration in the world. To restore the visual sensation of blind patients, we have proposed and developed a fully implantable retinal prosthesis. Our retinal prosthesis is a small, lightweight, and high-resolution device, which leads to a high quality of life (QOL) for patients. We have already fabricated the 3D retinal prosthesis chips with 1,500 pixels. Besides, we have successfully obtained EEPs from a rabbit by implanting the retinal prosthesis chip.

3D integration tech. & Analog/digital IC design

We have been developing 3-dimensional integration technologies and analog/digital IC design technologies to achieve high-speed and low-power IC beyond conventional 2D IC performances and to realize high-performance computing systems and advanced biomedical micro/nano integrated systems.

** Please contact us if you want to visit our lab.*