Biomechanical Engineering/Medical Nanosystem Engineering lab.

T. Tanaka & Kino Lab.

Dept. Biomedical Engineering / Dept. Mechanical Systems Engineering

Prof. TANAKA

Assos. Prof. KINO

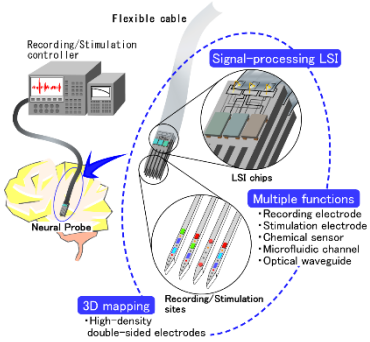
In this laboratory, you can conduct the world's most advanced manufacturing research based on semiconductor microfabrication and integration technology using various facilities in the cleanroom and laboratory. We welcome students who can proactively tackle the challenges ahead of them with logical thinking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

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

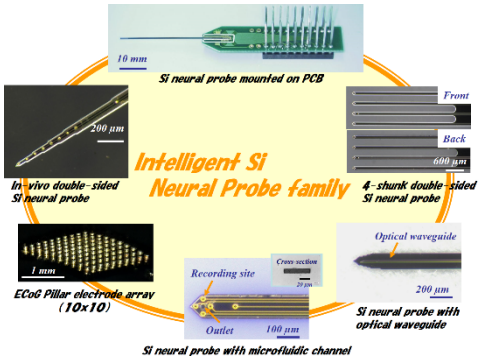
H31: Doctoral course 1, National public servant 1, Denso China 1, etc.
R2: Doctoral course 1, Fujitsu 1, JMU 1, Huawei 1, SEMES Korea 1, etc.
R3: Doctoral course 1, Sony 1, Terumo 1, Shimadzu 1, Sumibe 1, etc.
R4: Doctoral course 1, Huawei 1, Sony 1, Terumo 1, Fuji-elec 1, etc.

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

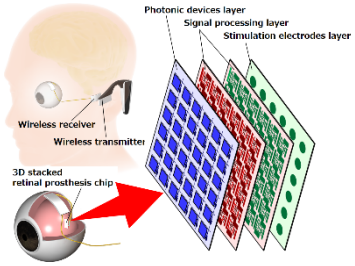
1. Intelligent neural probe and brain-machine interface
2. Fully-implantable retinal prosthesis system
3. Self-assembly technology and high-performance flexible sensor
4. 3D integration technology and analog/digital IC design

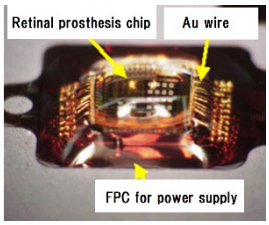


Neural probe penetrated into hippocampal slice.



【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 to make a diagnosis of brain diseases. The intelligent neural probe has various sensors, signal processing circuits, neuronal stimulation circuits, and so on. We have performed lots of collaborative research with many research institutes in the world.

Fully-implantable retinal prosthesis

More than 10 million patients have lost their visions 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 size, lightweight, and high resolution, which leads to a high quality of life (QOL) to the 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.*