We are developing a nano-biodevice that enables us to perform direct information exchange with a living organism. We aim at realizing an artificial synapse in order to understand the neuronal signaling mechanisms at the neuronal/molecular level as well as neuron/brain functions. This technique is also used for the medical field as a bio-friendly interface.

This research is undertaken partly in collaboration with the University of Oxford, UK.

Features
- Device based on membrane proteins embedded within artificial cell on a Si substrate (Post-synapse).
- Patterning of neurons using the selective neuron growth on a nano-pillar substrate (Pre-synapse).
- Measurement and control of protein function at the molecular level.
- Bio-friendly interface based on neuronal signaling mechanism at the molecular level.

Application Scenarios
- Elucidation of the neuronal transmission mechanism at molecular level
- Ultra-high sensitive chemical/biosensors
- Provision of highly individual medical care based on the acquisition of biological information
- High-throughput drug screening
- Understanding the mechanism of a disease such as Alzheimer dementia and amyotrophic lateral sclerosis (ALS) that are caused by synaptic abnormality