题目：Protein organic chemistry in live cells and beyond

摘要：

The aim of this research is to develop state-of-the-art molecular technologies that can facilitate the deep understanding of intracellular signal transmission and intercellular network formation in the neural systems and brain at the individual protein molecule level of resolution. Using such methods that enable to chemically label and image several key proteins such as neurotransmitter receptors, GPCRs and channel proteins in neural cells and brain tissues, the dynamic structural changes and critical functions of proteins in living cellular systems can be unveiled. Furthermore, by combining selective functional control of a target receptor in live cells with imaging techniques, we expect to analyze and clarify the complicated intercellular networks involving target receptor proteins for memory formation in brain. For this objective, this proposal will attempt to develop a new live-cell organic chemistry that can modify and regulate the target protein under the living cell conditions, which should be unique and complimentary to conventional chemical genetics or optogenetics approaches. In addition to developing these molecular technologies in the basic research fields of neuroscience and chemical biology, I am aiming to create a new field, a really interdisciplinary research area, termed neuro-chemical biology, which should be critically important between chemistry, biology and neuroscience toward a goal including development of innovative technologies for diagnosis and treatment of brain and neurological disorders such as schizophrenia and dementia.