

Outline of Selected Projects

Host institution	Kanazawa University
Center name	Nano Life Science Institute
Head of host institution	Koetsu Yamazaki
Prospective center director	Takeshi Fukuma

<Project Summary>

At the proposed research center, we will combine the world's most advanced technologies in bio-scanning probe microscopy (SPM) and supramolecular chemistry to develop novel "nanoendoscopic techniques" that allow us to directly image, analyze, and manipulate nanodynamics of proteins, metabolites, and nucleic acids both on the surface of and inside the cell. In addition, through the use of innovative nanoprobe techniques combined with other advanced analytical methods, we aim to achieve fundamental understandings of the nano-level mechanisms underlying basic cellular functions (e.g., cell differentiation/proliferation, stemness, signal transduction, genome dynamics, etc.) and their cancer-specific abnormalities. To this end, we will perform detailed comparisons between nanodynamics inside normal and cancer cells. Based on the developed technologies and knowledge acquired through such research works, we will establish a new research field termed "nanoprobe life science," which aims to achieve nano-level understandings of various life phenomena including cancer using advanced nanoprobe technologies.

<Remarks>

The University's new WPI project focuses on the development of an innovative bio-scanning probe microscope (Bio-SPM) and its application to the scientific analysis of biological functions on a nanoscale with a focus on cancer. Advanced microscopy, nanoscale analysis, and cancer research are all major strengths of Kanazawa University. As a highly innovative means of nanoscale observation, Bio-SPM is expected to greatly advance research in the life sciences.

The director of the new WPI center, Prof. Takeshi Fukuma, is, though young, already a leader in the field of Bio-SPM. He not only has the expertise but also the charisma to inspire and animate younger researchers, who come to the center from both Japan and around the world.

Good international collaboration with the United Kingdom and Canada add strength to the proposal.