



Title of Project : Resonance Biology for Innovative Bioimaging

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Research Project Number : 15H05947 Researcher Number : 80251445

【Purpose of the Research Project】

Using phenomenal behaviors in the coupling between electromagnetic waves and transition dipole moments of molecules, in the research project “Resonance Bio,” we develop new technologies that revolutionize bioimaging. This project is a collaborative effort principally by (bio)chemists who design molecules and optical physicists who control electromagnetic waves, and is creating a critical mass for technological innovations in bioimaging. Our technologies are expected to resonate in a variety of research communities to catalyze a paradigm shift in our understanding of disease development.

【Content of the Research Project】

Given the project’s liberal environment, all the members will have a chance to share several critical problems confronting current bioimaging. Although subject to change, examples include “What are the forthcoming techniques for super-resolution and deep imaging?”, “How should we investigate stress, an ambiguous phenomenon, both intensively and extensively?”, “How can we zoom in on and out of a biological structure at diverse spatial scales?”, “How should we cope with terabyte image data?”, and “What are the theoretical and practical dimensions of bioimaging?”.

While this project focuses on the interaction between light and molecules, it

may also incorporate technologies from other areas, such as those that employ electrons and sound. In addition, non-life scientists are highly welcome. For example, software contests sponsored by this project are expected to motivate general programmers to take the plunge into bioimaging. We will actively disseminate information on the progress and achievements of this project worldwide through our publications and the Web. Our efforts will hopefully speed up the progress of many life sciences in Japan as we address the growing needs of those fields.

【Expected Research Achievements and Scientific Significance】

Advances in dissemination will make it easy to standardize bioimaging techniques to meet biologists’ demands and desires. This is expected to activate the bioimaging industry that handles dyes, microscopy systems, and software. Bioimaging technologies developed in this project will be spread into the industrial world, such as the pharmaceutical industry, and will improve quality of life.

【Key Words】

Bioimaging, light microscopy, image processing, fluorescent protein

【Term of Project】 FY2015-2019

【Budget Allocation】 1,198,000 Thousand Yen

【Homepage Address】

<http://reso.m.ehime-u.ac.jp>