Title of Project : Harmonized supramolecular motility machinery and its diversity

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【Purpose of the Research Project】

The molecular mechanism of force generation by "conventional" motor proteins, e.g. myosin, kinesin, and dynein, is now fairly well understood after decades of research. However, many mechanisms of motility, including the surface and swimming motilities of bacteria and protozoa, cannot be explained using only conventional motor proteins. Such motilities are driven by highly organized structures, which we call "supramolecular motility machinery", and their diversity records the evolutional history of life on earth. Our research project will focus on these fascinating but poorly characterized motility mechanisms through studies from the atomic to the supramolecular-complex scales using cutting -edge analysis technologies.

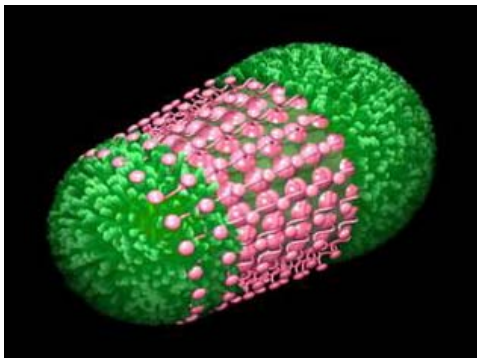

Figure 1　Cartoon of *Mycoplasma* cell surface (The supramolecular motility machinery is shown in pink)

【Content of the Research Project】

Researchers of supramolecular motility machineries working in different fields will come together and accelerate their studies based on multiscale methodology, including microbiology, genetics, biochemistry, biophysics, and structural biology. Our research project encourages studies of motility mechanisms which have not been characterized deeply as exploratory studies but also welcomes expert researchers on conventional motor proteins entering our field. Visualization techniques at the sub nanometer scales are critical for our field, and three of them, cryoelectron tomography, quick/freeze/replica electron microscopy, and fast scan AFM (atomic force microscopy) will be supported to develop applications for our studies. We will provide the latest information to both researchers and lay citizens effectively by stimulating interests in novel motilities and new platforms of multimedia.

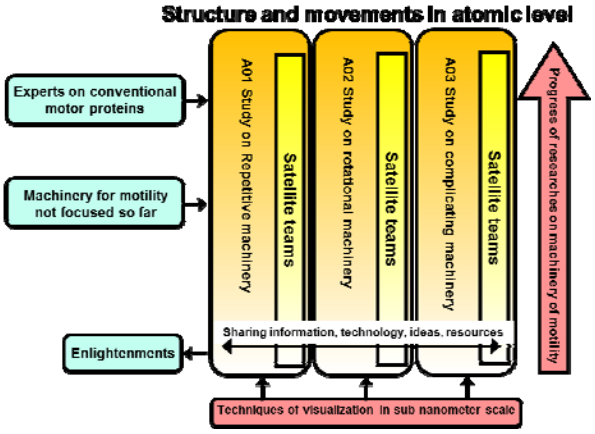

Figure 2　Overview of this research project

【Expected Research Achievements and Scientific Significance】

A concrete picture of various motility mechanisms will totally change our understanding of the motility of organisms and their evolutionary origins. Comparison of different mechanisms will allow us to understand the essence of motility, including the conventional motor proteins.

【Key Words】

Conventional motor proteins: The proteins responsible for force generation which have been studied extensively for a long time, including myosin, kinesin, and dynein. These proteins obtain energy through ATP hydrolysis and slide on actin filaments or microtubules.

【Term of Project】　FY2012-2016

【Budget Allocation】 1,162,600 Thousand Yen

【Homepage Address and Other Contact Information】

http://bunshi5.bio.nagoya-u.ac.jp/~mycmobile/index.html