

量子技術を適用した生命科学基盤の創出
平成 30 年度採択研究者

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Fast Synchronous Quantum Wave Modulation for High-Resolution Biological
Observations
(高速量子波面モジュレーション・クライオ電顕)

§ 1. 研究成果の概要

In the initial period of the project, I investigated the overall characteristics of the optical system. Theoretical calculations were used to determine the appropriate values of several parameters that define the general behavior of the system. These values were selected using criteria for ideal experimental performance. Based on the theoretically determined target parameters, I performed numerical simulations to optimize the design of the optical elements. The goal was to determine the optimal setup in terms of performance, efficiency and manufacturability. The simulation results indicated that it would be possible to produce the necessary optical element and I selected the style and parameters for the first optical element prototype. It will be constructed in the next research period. I also began the design process of the optics control unit and started the construction of the first prototype. During the initial period I tested the performance of the development platform microscope and confirmed its capabilities. Furthermore, datasets with test samples and actual biologically relevant specimens were collected using the conventional cryo-EM approach and the Volta phase plate approach in order to establish baselines for the capabilities of the current methods.

§ 2. 研究実施体制

①研究者:Radostin Danev (The University of Tokyo, Graduate School of Medicine; Professor)

②研究項目

- Design of research
- Theoretical evaluation of the optical system
- Computer simulation of optical elements
- Design of optical elements
- Design of optics control unit
- Testing of the development platform microscope
- Data acquisition with test samples
- Data acquisition with actual biological samples