1P314   Optical microdevice operated through self-organization of microtubule and kinesin: A simulation study
Takahiro Nitta¹, Yuichi Hiratsuka² (¹*Gifu Univ.*, ²*JAIST*)

Fish melanocytes change their appearances through aggregations and dispersions of melanosomes, corresponding to bright and dark, respectively. Here, we have envisioned an optical microdevice which changes its color through self-organizations of microtubules and kinesins. Formations and disassemblies of microtubule asters lead to aggregations and dispersions of kinesin-streptavidin complexes, which are “melanosomes” in the device. We investigated the feasibility of the device with a computer simulation. The simulation showed that the kinesin-streptavidin complexes initially distributed all over the chamber could be accumulated at the center of the aster. With the computer simulation, we will show guidelines for the design of the envisioned optical device.

1P117   Single Nucleosome under Tension and Torsion
Jen-Chien Chang¹, Michel de Messieres², Arthur La Porta¹ (¹*Dept. Phys., University of Maryland, USA*, ²*National Institute of Health, Bethesda, MD, USA*)

The fundamental chromatin packing unit in eukaryotes is the nucleosome. Prior single-molecule experiments have exerted linear tension to stretch both chromatin fibers and mononucleosome, which have given information on the nature of the free-energy barrier for a particular disruption pathway. We develop a theoretical model including torsional constraints, which suggests that the disruption pathway may be sensitive to the torsional loading of the nucleosome. Experimentally we apply force and torque simultaneously to disrupt a mononucleosome using an optical torque wrench. Positive supercoiling is found to destabilize the nucleosome while negative supercoiling has little effect, which is consistent with our model.

1P315   Three-Dimensional Movements of Microtubule Driven by Kinesin on Microfabricated Tracks Revealed with a Computer Simulation
Yuki Ishigure, Takahiro Nitta (*Gifu University*)

Motility assay of kinesin and microtubule (MT) has been utilized to power Lab-on-a-Chip devices, which are miniaturized chemical analysis systems. On the devices, driven by kinesin motors on microfabricated tracks, MTs carrying cargo are delivered to their destinations. When a MT comes to a boundary of the tracks, outcomes are either MT continuing to move along the boundary or MT dissociation. Although, predictions of the outcomes in given conditions are important in designing microfabricated tracks, such predictions are hampered by limited information obtained from optical microscopes on details of MT movements. Here, we performed a computer simulation, and revealed the details of MT movements at the boundaries of microfabricated tracks.

**1P316   明視野/蛍光画像の同時リアルタイム解析技術を用いたオンチップ・マルチイメージング・フローサイトメーターの開発
Development of On-chip Multi-imaging Flow Cytometer System using Real-time Bright Field/Fluorescent Dual Image Analysis High-speed Camera**
Akihiro Hattori¹, Hyonchol Kim², Hideyuki Terazono¹, Masao Odaka², Mathias Girault¹, Kenji Yasuda^{1,2} (¹*Department of Biomedical Information, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University*, ²*Kanagawa Academy of Science and Technology*)

We have developed an on-chip multi-imaging flow cytometer system for a real-time bright field/fluorescent dual-image analysis. The system consists of (1) a disposable microfluidic chip, (2) a bright field/fluorescent dual-image microscopic optical system, and (3) a real-time high-speed digital camera with image-processing function. For the high-speed image acquisition, we adopted single-band width LED light source, synchronized with camera shutter intervals, and FPGA circuit was directly connected to the camera part. Using this system, we analyzed not only shapes of cell, but also nuclei formation with faster than 1/200 s. In this meeting, we introduce the potential and possibilities of this system and the new index of cell identification, ‘imaging biomarkers’.