1SAA-07 人工光合成の構築に向けた水の酸化触媒の開発**Development of molecular catalysts for water oxidation toward artificial photosynthesis****Masayuki Yagi** (*Niigata Univ.*)

A photosynthetic photosystem II (PS II) model was developed by adsorbing, $[(\text{OH}_2)(\text{terpy})\text{MnIII}(\mu\text{-O})_2\text{MnIV}(\text{terpy})(\text{OH}_2)]^{3+}$ (1, terpy = 2,2':6',2''-terpyridine) as an oxygen evolving center and $\text{Ru}(\text{bpy})_3^{2+}$ (bpy = 2,2'-bipyridine) as a photoexcitation center onto mica. 1 is considered to work for photochemical water oxidation in mica adsorbate due to an efficient electron transport from deeply-intercalated 1 to $\text{S}_2\text{O}_8^{2-}$ ions in a liquid phase via $\text{Ru}(\text{bpy})_3^{2+}$ photoexcitation near the mica adsorbate surface.

1SBA-03 細胞サイズ液滴内での高分子混合系の相分離とゾル-ゲル転移**Aqueous phase separation and sol-gel transition of biopolymer blend in cell-sized droplets****Miho Yanagisawa** (*Grad. Sch. Sci., Kyushu Univ.*)

In cells, phase separation and sol-gel transition of biopolymers plays important roles in regulating their structures, shapes and movements. To reveal the mechanism, cell-sized droplets coated by a lipid layer encapsulating polymers have been used as model cells [1]. When DNA and polyethylene glycol (PEG) blend in homogeneous phase was encapsulated in the droplets, phase separation was triggered in smaller droplets due to depletion effects among semi-flexible DNA and flexible PEG molecules. In addition, we report a phase behavior of PEG/gelatin system in droplets, where phase separation and gelation of gelatin complete with a decrease in temperature, and generate great variety of micro-gel patterns.

[1] M. Yanagisawa et al., *Soft Matter*, 9:5891, 2013.**1SBA-01 動的人工細胞・分子ロボットの作製のための微小非平衡場の制御****Control of micro-sized nonequilibrium system for the construction of dynamic artificial cells and molecular robots based on microfluidics****Masahiro Takinoue** (*Interdisciplinary Grad. Sch. Sci. & Eng., Tokyo Tech.*)

Construction of artificial cells and molecular robots has been attracted much attention these days. To make them more complex and sophisticated, it is required to add dynamic features such as autonomous motion, autonomous information processing, etc. to them. In this presentation, I show two technologies for the construction of dynamic artificial cells and molecular robots: (i) a micro-sized nonequilibrium reaction system for an artificial cell; (ii) generation of anisotropic complex microhydrogel structures for cell-sized self-propelled matter. Finally, I would like to discuss the future of dynamic artificial cells and molecular robots.

1SBA-04 外部環境情報をリボソーム基盤分子ロボットの内部に伝達する分子センサーの開発**A development of molecular sensor that delivers environmental information to inside of liposome-based molecular robots****Koh-ichiroh Shohda**, Akira Suyama (*Department of Life Sciences, Graduate School of Arts and Sciences, The University of Tokyo*)

In the molecular robotics project, a planned molecular robot which is based on a liposome or a gel as a body consists of molecular sensors, molecular computers, and molecular actuators. These components are communicated with single-stranded DNAs each other. We cover a development of molecular sensor which is a conjugated molecule between DNA strands and lipid. This sensor molecule located on a surface of liposome can hybridize with a complementary DNA/RNA strand which represents an environmental information. The hybridization causes a shape change of the molecular sensor, consequently a single-stranded DNA will be released into an inner water pool of liposome. The released DNA will be a trigger for molecular computers encapsulated in the liposome.

1SBA-02 分子ロボティクス指向による人工細胞構築**Molecular robotics approach for constructing an artificial cell model****Shin-ichiro Nomura M.**¹, Kei Fujiwara^{1, 2} (¹*Department of Bioengineering and Robotics, Division of Mechanical Engineering, TOHOKU University*, ²*JSPS Research Fellows*)

Prototype artificial cell models with designed functional molecules are presented here. Artificial molecular devices based on a giant liposome were prepared to obtain specific properties that cannot be obtained from natural cells. In this context, artificial cell research is seen an extension of "molecular robotics" research. Cooperative and integrated chemical systems will be constructed from both artificial and semi-artificial molecular devices. Here, we present several aspects of the study models. : (1) gene-expressing cell model encapsulated in the liposome to simulate membrane protein synthesis, (2) multirole molecular device with a designed DNA nanostructure on the cellular membrane, and (3) designed molecules for compartmentalization. These artificial devices will be integrated to develop novel tools for constructing yet-another artificial cell.

1SBA-05 アクチン線維とミオシン、細胞サイズの膜小胞を利用した分子アメーバ構築の試み**Construction of motile artificial cell model using actomyosin and cell-sized giant liposome****Kingo Takiguchi**, Masahito Hayashi (*Grad. Sch. Sci., Nagoya Univ.*)

Cytoskeletal system, which consists of actin, microtubule, and their collaborating proteins and molecular motors, is a native superior micro machine. It is involved in a number of activities regarding morphogenesis, transporting, movement, and force generation, in a wide range of the biological hierarchy, for example, from swimming of unicellular organism to movements of multicellular organism that are caused by muscle contraction.

In order to utilize the performance, attempts to generate various molecular motions in vitro using purified actin and myosin and studies to develop cell-sized liposomes incorporating active actomyosin inside have been performed. Here, we introduce some of the outcomes, and describe problems to be overcome and outlook for the future.