1 日目（11 月 14 日（火））／Day 1（Nov. 14 Tue.）

1SAA　AI と実験のコンチェルトで奏でる生命科学のパラダイムシフト
The paradigm shift of biological science played by AI–experiment concerti

共催 JST/CREST「バイオ DX」

オーガナイザー：井上 圭一（東京大学），田端 和仁（東京大学）
Organizers: Keiichi Inoue (The Univ. of Tokyo), Kazuhito Tabata (The Univ. of Tokyo)

09:00〜11:30
A 会場（展示室 211（2 号館 1F））／Room A（Exhibition Room 211 (Bldg. 2, 1F)）

The applications of AI in biological and medical fields have been rapidly progressing in these decades. In particular, the structural prediction by Alphafold2 drastically changed the situation of structural biology. The application of AI, however, in other fields is not so established, and many drastic developments are still being demanded. In this symposium, we will present cutting-edge studies incorporating both AI and experiments in a complementary manner for biological and chemical applications. Given the current situation in each discipline, we will discuss the future perspective of biological discovery and paradigm shift by integrating AI and experimental approaches.

はじめに
Opening Remarks

1SAA-1　**高機能性タンパク質のデザインのための機械学習法の開発およびロドプシンの吸収波長制御への応用**
Development of a new machine-learning method to design high functional proteins and an application for the color tuning of rhodopsins
○井上 圭一（東大・物性研）
Keiichi Inoue (*Inst. Solid State Phys.*)

1SAA-2　**機械学習を用いた微生物ロドプシンのデータ駆動型吸収波長予測**
Data-Driven Prediction for Absorption Wavelengths of Microbial Rhodopsins by using Machine Learning Approaches
○烏山 昌幸（名古屋工業大学）
Masayuki Karasuyama (*Nagoya Institute of Technology*)

1SAA-3　**環状ペプチドの構造と膜透過性に関する大規模データ取得のための方法論の開発**
Development of methodologies for obtaining a large dataset of structures and membrane permeability of cyclic peptides
○森本 淳平（東京大・院工）
Jumpei Morimoto (*Grad. Sch. Eng., Univ. Tokyo*)

1SAA-4　**構造安定性のメガスケール解析**
Mega-scale experimental analysis of protein folding stability in biology and protein design
○坪山 幸太郎 [1,2], ロックリン ガブリエル [2]（[1] 東京大学　生産技術研究所, [2] ノースウェスタン大学）
Kotaro Tsuboyama[1,2], Gabriel Rocklin[2] ([1]*IIS UTokyo*, [2]*Northwestern Univ.*)

1SAA-5 BioDOS: 遺伝子ネットワークの自動デザインを行う論理推論 AI
BioDOS: AI Inference engine for Bio-design automation of genetic network
○木賀 大介 [1], 奥田 宗太 [1], 宮崎 和光 [2], 小玉 直樹 [3], 山村 雅幸 [4]（[1] 早大・電気情報生命, [2] 大学改革支援・学位授与機構, [3] 明大・理工, [4] 東工大・情報院理工院）
Daisuke Kiga[1], Sota Okuda[1], Kazuteru Miyazaki[2], Naoki Kodama[3], Masayuki Yamamura[4] ([1]*Dept Elect Eng and Biosci, Waseda Univ*, [2]*Nation. Inst. for Acad. Deg. & Quality Enhance. of High. Edu.*, [3]*Sch. Sci. and Tech., Meiji Univ.*, [4]*Sch. Comput., Tokyo tech*)

おわりに
Closing Remarks

1SBA クロマチンと SMC タンパク質の動態から理解するゲノムモダリティ
Understanding genome modality of the dynamics of chromatin and SMC proteins

共催 学術変革領域研究（A）「ゲノムモダリティ」

オーガナイザー：前島 一博（国立遺伝学研究所），山本 哲也（北海道大学）
Organizers: Kazuhiro Maeshima (NIG), Tetsuya Yamamoto (Hokkaido Univ.)

09:00〜11:30
B 会場（展示室 212（2 号館 1F））／Room B（Exhibition Room 212 (Bldg. 2, 1F)）

Recent advances of experiments have revealed the multiscale structure and dynamics of eukaryotic genome. Genome forms domains, such as topologically associated domains and compartments, in the mesoscopic length scale (100k-10Mbps) and the dynamics of SMC proteins plays a key role in assembling such domains. In this symposium, we invite experts of the dynamics of chromatin and SMC proteins and the self-assembly of DNA to discuss the biophysical principle behind the structural formation and dynamics of genome.

はじめに
Opening Remarks

1SBA-1 SMC 複合体 DNA セグメントキャプチャーモデルの粗視化シミュレーション
DNA-segment Capture by SMC Complex –A Coarse-grained Simulation Study–
○山内 仁喬, 寺川 剛, ブランダーニ ジョバンニ ブルーノ, 高田 彰二（京都大学・理・生物物理）
Masataka Yamauchi, Tsuyoshi Terakawa, Giovanni Bruno Brandani, Shoji Takada (*Dept. of Biophysics, Grad. of Sci., Kyoto Univ.*)

1SBA-2 Direct visualization of DNA-bound cohesin by HS-AFM
Yumiko Kurokawa[1,2], Kenichi Umeda[3], Noriyuki Kodera[3], Yasuto Murayama[1,2] ([1]*Dept. of Chrom. Sci., Nat. Inst. of Genetics*, [2]*Dept. of Genetics, SOKENDAI*, [3]*WPI-NanoLSI, Kanazawa Univ.*)

1SBA-3 コヒーシン二量化による分子障壁を越えたクロマチンループ形成
Formation of chromatin loops by cohesin dimerization over molecular obstacles
○藤城 新（京都大学 福井謙一記念研究センター）
Shin Fujishiro (*Fukui Institute for Fundamental Chemistry, Kyoto University*)

1SBA-4 Replication-dependent histone (Repli-Histo) labeling revealed that chromatin motion can determine DNA replication timing
Katsuhiko Minami[1,2], Satoru Ide[1,2], Sachiko Tamura[1], Masato T. Kanemaki[1,2], Kazuhiro Maeshima[1,2] ([1]*National Institute of Genetics*, [2]*Graduate Institute for Advanced Studies, SOKENDAI*)

1SBA-5 ゲノムサイズの核酸集合体の液-液相分離のデザイン・制御と応用
Design, control, and application of liquid-liquid phase separation of genome-sized nucleic-acid assembly
○瀧ノ上 正浩 [1,2,3]（[1] 東工大・情報理工, [2] 東工大・生命理工, [3] 東工大・リビングシステムズ材料学研究拠点）
Masahiro Takinoue[1,2,3] ([1]*Dept. Compt. Sci., Tokyo Tech*, [2]*Dept. Life Sci. Tech., Tokyo Tech*, [3]*LiSM, IRFI, Tokyo Tech*)

1SBA-6 A loop extrusion-independent mechanism contributes to chromosome shaping by the condensin complexes
Kazuhisa Kinoshita (*Chromosome Dynamics Lab., RIKEN*)

1SBA-7 Elasticity control of entangled chromosomes: crosstalk between condensin complexes and nucleosomes
Yamamoto Tetsuya[1], Kinoshita Kazuhisa[2], Hirano Tatsuya[2] ([1]*ICReDD, Hokkaido Univ.*, [2]*Riken*)

1SCA 界面における細胞骨格のダイナミクス
Cytoskeletal dynamics at the boundaries

オーガナイザー：島本 勇太（国立遺伝学研究所），宮﨑 牧人（京都大学）
Organizers: Yuta Shimamoto (NIG), Makito Miyazaki (Kyoto Univ.)

09:00〜11:30
C 会場（会議室 221（2 号館 2F））／Room C（Conference Room 221 (Bldg. 2, 2F)）

Cells are compartmentalized by various planer boundaries. At each boundary (e.g., the plasma membrane, the nuclear envelope, and organelle surfaces), cytoskeletal proteins form filamentous meshworks and act dynamically to control cell physiology. Whereas the propensities of individual cytoskeleton and membrane components have been extensively studied, how they work together remains a mystery. This symposium gathers early-career researchers from diverse disciplines, aiming to illuminate the fascinating interplay at these biological boundaries. We envision that the symposium provides an opportunity to foster new ideas and questions that encourage young scientists and promotes exciting biophysics by crossing the interdisciplinary boundaries.

はじめに
Opening Remarks

1SCA-1 アクトミオシンの収縮による膜変形プロセスの再構成
Morphological transitions of lipid vesicles driven by the contraction of cortical actomyosin networks
○宮﨑 牧人 [1,2,3]（[1] 京大・院理, [2] 理研 BDR, [3]JST さきがけ）
Makito Miyazaki[1,2,3] ([1]*Grad. Sch. Sci., Kyoto Univ.*, [2]*RIKEN BDR*, [3]*PRESTO, JST*)

1SCA-2 Spatial organization of cytoplasm directed by the cytoskeleton in human cell extracts
Shohei Yamamoto, Daiju Kitagawa (*Grad. Sch. Pharma. Sci., Univ. Tokyo*)

1SCA-3 カドヘリン/アクトミオシンを介した細胞間張力がモルフォゲン勾配の頑強性を支える
Intercellular tension generated by cadherin-actomyosin interaction ensures robust morphogen gradient formation
○青木 佳南, 樋口 大樹, 石谷 太（阪大・微研・生体統御）
Kana Aoki, Taiki Higuchi, Tohru Ishitani (*Dept. of Homeostatic regulation, RIMD, Osaka Univ.*)

1SCA-4 **オルガネラを支配する力の指輪：オルガネラ分裂リングの分子動作機構**
The rings of power to rule organelles: mechanism of force generation by the organelle division ring
○吉田 大和 [1,2]（[1] 東京大・院・理・生物科学, [2]JST・さきがけ）
Yamato Yoshida[1,2] ([1]*Dept. of Biol. Sci., Grad. Sch. Sci., Univ. of Tokyo*, [2]*JST PRESTO*)

1SCA-5 Plant cytoskeletal dynamics at the nuclear periphery
Kentaro Tamura (*Sch. Food Nutr., Univ. Shizuoka*)

1SCA-6 **初期胚発生における核膜ラミンの時空間動態**
Dynamics of nuclear lamins during early embryonic development
○島本 勇太 [1,2]（[1] 遺伝研, [2] 総研大）
Yuta Shimamoto[1,2] ([1]*Nat'l Inst Genetics*, [2]*SOKENDAI*)

おわりに
Closing Remarks

1SDA ようこそ、ボーダーレスなロドプシンの世界へ
Welcome to the borderless rhodopsin world

共催 JST/CREST「オプトバイオ」

オーガナイザー：山下 高廣（京都大学），角田 聡（名古屋工業大学）
Organizers: Takahiro Yamashita (Kyoto Univ.), Satoshi Tsunoda (Nagoya Inst. of Tech.)

09:00〜11:30
D 会場（会議室 222+223（2 号館 2F））／Room D（Conference Room 222+223 (Bldg. 2, 2F)）

Rhodopsin is a general term for photoreceptive proteins which bind retinal as a chromophore. Rhodopsins are classically classified into two types, animal-type and microbial-type. These two types show no sequence similarities with each other, which leads to the diversity of their molecular functions. However, recent accumulation of the molecular properties of rhodopsins has crossed the border between animal-type and microbial-type. Moreover, the application of various rhodopsins to optogenetics not only contributes to the understanding of the molecular mechanisms underlying the physiological functions in animals but also opens a new field in the treatments of diseases. In this symposium, we would like to introduce the “borderless” rhodopsin world.

はじめに
Opening Remarks

1SDA-1 **動物オプシンと微生物オプシンの境界を超える光サイクル型動物オプシン**
Photocyclic animal opsins break the boundary between animal and microbial opsins
○山下 高廣（京都大・院理）
Takahiro Yamashita (*Grad. Sch. of Sci., Kyoto Univ.*)

1SDA-2 **ベストロドプシン：ユニークな光反応を示す新奇光開閉式陰イオンチャネル**
Bestrhodopsin: a novel light-gated anion channel with unique photoreaction
○今野 雅恵（東大・物性研）
Masae Konno (*ISSP, Univ. Tokyo*)

1SDA-3 **プロトンポンプ型ロドプシンを用いたアポトーシスの光制御**
Optical control of apoptotic cell death by a proton pump rhodopsin
○小島 慧一, 須藤 雄気（岡山大・学術研究院医歯薬）
Keiichi Kojima, Yuki Sudo (*Fac. Med. Dent. Pharm. Sci. Okayama Univ.*)

1SDA-4　**動物ロドプシンの多様性と双安定型の動物ロドプシンを用いた GPCR シグナル伝達の分子特性依存的な光操作**
Diversity of animal rhodopsin and optical control of GPCR signaling by bistable animal rhodopsins in a molecular property-dependent manner
○小柳 光正 [1,2]（[1] 大阪公大・院理, [2] 大阪公大・複合先端機構）
Mitsumasa Koyanagi[1,2] ([1]*Grad. Sch. Sci., Osaka Met. Univ.*, [2]*OMU Adv. Res. Ins. Nat. Sci. Tech., Osaka Met. Univ.*)

1SDA-5　**ようこそ、視覚再生遺伝子治療開発の世界へ**
Welcome to the Visual Restoration Gene Therapy Development World
○堅田 侑作 [1,2]（[1] 慶應大・医学部, [2] ㈱レストアビジョン）
Yusaku Katada[1,2] ([1]*Med., Keio Univ.*, [2]*Restore Vision Inc.*)

1SDA-6　**高感度チャネルロドプシンを利用した視覚疾患遺伝子治薬療開発へ向けて**
Development of gene therapy for vision restoration by using a channelrhodopsin with high light sensitivity
○角田 聡 [1,2]（[1] 名古屋工業大学　生命応用化学専攻, [2] 名古屋工業大学　オプトバイオテクノロジー研究センター）
Satoshi Tsunoda[1,2] ([1]*Department of Life Science and Applied Chemistry, Nagoya Institute of Technology*, [2]*OptoBioTechnology Research Center, Nagoya Institute of Technology*)

おわりに
Closing Remarks

1SEA　高速 AFM の生体分子計測と情報の融合
Integrating biomolecular measurements and IT in high-speed AFM

オーガナイザー：高田 彰二（京都大学），古寺 哲幸（金沢大学）
Organizers: Shoji Takada (Kyoto Univ.), Noriyuki Kodera (Kanazawa Univ.)

09:00〜11:30
E 会場（会議室 224（2 号館 2F））／Room E（Conference Room 224 (Bldg. 2, 2F)）

High-speed AFM has been a unique experimental method that can observe single biomolecular structural dynamics at near physiological condition. However, AFM data directly provide information of the surface envelope of the specimen at intermediate resolution both in time and space so that the underlying three-dimensional structures and their movements need to be inferred from some computations for quantitative analysis. The workshop focuses on recent efforts towards integration of high-speed AFM measurements and information technology (IT)-based methods that are expected to make high-speed AFM methods more powerful in the coming years.

はじめに
Opening Remarks

1SEA-1　**ミオシン V の歩行運動のデータ同化解析：高速原子間力顕微鏡データと分子シミュレーション**
Data assimilation analysis of myosin V walking: High-speed atomic force microscopy data and molecular simulations
○渕上 壮太郎 [1], 松永 康佑 [2], 高田 彰二 [3]（[1] 静県大・薬, [2] 埼大院・理工, [3] 京大院・理）
Sotaro Fuchigami[1], Yasuhiro Matsunaga[2], Shoji Takada[3] ([1]*Sch. Pharm. Sci., Univ. Shizuoka*, [2]*Grad. Sch. Sci. Eng., Saitama Univ.*, [3]*Grad. Sch. Science, Kyoto Univ.*)

1SEA-2 ノイズを含む原子間力顕微鏡画像のためのエンド・ツー・エンド微分可能な探針形状再構成法
End-to-end differentiable blind tip reconstruction for noisy atomic force microscopy images
○松永 康佑（埼大院・理工）
Yasuhiro Matsunaga (*Grad. Sch. Sci. Eng., Saitama Univ.*)

1SEA-3 Protein dynamics by the combination of high-speed AFM and computational modeling
Holger Flechsig (*Nano Life Science Institute (WPI-NanoLSI), Kanazawa University*)

1SEA-4 微小管切断酵素カタニンの高速 AFM による可視化
Visulalization of microtubule severing by High-speed AFM
大野 麻莉菜 [1], 渋谷 颯人 [1], 古寺 哲幸 [2], ○林 郁子 [1] ([1] 横浜市立大学大学院生命医科学研究科, [2] 金沢大学ナノ生命科学研究所)
Marina Ohno[1], Hayato Shibuya[1], Noriyuki Kodera[2], **Ikuko Hayashi[1]** ([1]*Grad. Sch. Med. Lif. Sci., Yokohama City Univ.*, [2]*NanoLSI, Kanazawa Univ.*)

1SEA-5 Structure and dynamics of oligomers of the TIR domain of MyD88
Hidehito Tochio (*Grad. Sch. Sci., Kyoto Univ.*)

1SEA-6 Sub-molecular-scale observation of Structural Maintenance of Chromosomes complexes by high-speed AFM
Kenichi Umeda[1,2], Yumiko Kurokawa[3], Yasuto Murayama[2,3], Noriyuki Kodera[1] ([1]*WPI-NanoLSI, Kanazawa Univ.*, [2]*JST-PRESTO*, [3]*Nat. Inst. Genetics*)

おわりに
Closing Remarks

1SFA 生体ー環境相互作用をトランススケール解析する学際的アプローチ
Interdisciplinary approaches for trans-scale analysis of organism-environment interactions

共催 学術変革領域研究（B）「筋熱シグナリング」

オーガナイザー：鈴木 団（大阪大学），大山 廣太郎（量子科学技術研究開発機構），
山澤 徳志子（東京慈恵会医科大学）
Organizers: Madoka Suzuki (Osaka Univ.), Kotaro Oyama (QST),
Toshiko Yamazawa (The Jikei Univ.)

09:00〜11:30
F 会場（会議室 231（2 号館 3F））／Room F（Conference Room 231 (Bldg. 2, 3F)）

Response of an organism to external stimuli is an essential step for adaptation to external environment. The response relies on that of cells, biomolecules, and their network. In this symposium, we explore the interactions between organisms and environment throughout the spatial scales. We begin with speakers who examine heat and thermal responses at the scales of atoms, molecules and cells. Their interdisciplinary approaches span over biophysics, computational chemistry, and material science. Next, quantitative fluorescence imaging of kinase activities will be introduced as a representative intracellular signaling that can be perturbed quickly by thermal stimulus. Lastly, we will learn how the organism-environment interactions have been examined successfully by state-of-the-art robots as a constructive approach. This symposium is suitable for those who are interested in interdisciplinary approaches to examine the interaction of biological systems with environment at any spatial scales of biological systems.

はじめに
Opening Remarks

1SFA-1　ミオシン ATP 加水分解初期過程における力学的仕事生成
Mechanical Work Generation at Early Stage of ATP Hydrolysis in Myosin
○栗崎 以久男 [1], 鈴木 団 [2]（[1] 早稲田大学理工学術院総合研究所, [2] 大阪大学蛋白質研究所）
Ikuo Kurisaki[1], Madoka Suzuki[2] ([1]*Waseda Research Institute for Science and Engineering*, [2]*Institute for Protein Research, Osaka University*)

1SFA-2　タンパク質分子中における振動エネルギーフロー時空間マップ
Spaciotemporal mapping of vibrational energy flow in proteins
○水野 操（京大・院理）
Misao Mizuno (*Grad. Sch. Sci., Kyoto Univ.*)

1SFA-3　合成色素を用いた脂質膜のナノ温度計測と局所加熱
Nanothermometry and local heating of lipid membranes using synthetic dyes
○新井 敏, 山崎 健, コン・クァン ブー（金沢大　ナノ研）
Satoshi Arai, Takeru Yamazaki, Vu Cong Quang (*WPI-NanoLSI, Kanazawa univ.*)

1SFA-4　ストレス応答 MAPK シグナルの動的制御とその細胞運命決定への寄与
Dynamics and function of stress-activated MAPK signaling in determining cell fates
○冨田 太一郎, 三上 義礼, 大島 大輔, 鄭 有人, 赤羽 悟美（東邦大・医・統合生理）
Taichiro Tomida, Yoshinori Mikami, Daisuke Ohshima, Yuuto Tei, Satomi Adachi-Akahane (*Dept. Physiology, Fac. Med., Toho Univ.*)

1SFA-5　身体と環境の相互作用から生まれる多様で適応的な運動解明に向けた工学的アプローチ
An engineering approach to investigate the various adaptive behavior derived from the interaction between the body and the environment
○杉本 靖博（大阪大学・工学研究科）
Yasuhiro Sugimoto (*Grad. Sch. of Eng., Osaka Univ.*)

おわりに
Closing Remarks

1SGA　生物物理学のための一分子ナノポア計測の基礎と応用
The fundamental and applications of single-molecule nanopore sensing for biophysical studies

オーガナイザー：山崎 洋人（長岡技術科学大学），庄司 観（長岡技術科学大学），
彭 祖癸（東京農工大学）
Organizers: Hirohito Yamazaki (Nagaoka Univ. of Tech.), Kan Shoji (Nagaoka Univ. of Tech.), Peng Zugui (Tokyo Univ. of Agric. and Tech.)

09:00〜11:30
G 会場（会議室 232+233（2 号館 3F））／Room G（Conference Room 232+233 (Bldg. 2, 3F)）

Life at the molecular levels is modulated by the dynamics and interactions of biological molecules. To understand them, single molecule techniques is straight-forward way to investigate in details. Among the techniques, nanopore sensing is a label-free/high through-put apprach, which measure a modulation of ionic current passing through a nanopore.In this symposium, we will organize the session to boost adoption of nanopore sensing and co-develop advanced solutions in biophysical community. To provide deep-understanding of the sensing, the symposium consists of two parts: how the nanopore sensing work fundamentally and how this sensing can be used for applications.

1SGA-1　Single Molecule Biophysical Studies Using Nanopore Sensing: History and Basic Principles
Hirohito Yamazaki (*TRI, Nagaoka Univ. Tech.*)

1SGA-2 Engineered Nanostructures for Single-Protein Characterisation
Cuifeng Ying (*Dept. of Eng., Sch. of Sci. & Tech., Nottingham Trent Univ., UK*)

1SGA-3 Physically insertion of DNA nanopores into liposomes using nanopore-modified microelectrodes
Hiroki Koiwa[1], Shin-ichiro Nomura[2], Satoshi Murata[2], Kan Shoji[1] ([1]*Graduate School of Engineering, Nagaoka University of Technology*, [2]*Graduate School of engineering, Tohoku University*)

1SGA-4 Molecular Dynamics Study of Ion Transport Through Membrane-Spanning DNA Nanopores
Takuya Mabuchi (*Tohoku University*)

1SGA-5 Scanning Ion Conductance Microscopy Using Biological Nanopore Probes
Kan Shoji (*Nagaoka Univ. Tech.*)

1SGA-6 Theoretical prediction of the nanoparticle size by the resistive-pulse technique with cylindrical and conical nanopores
Yinghua Qiu[1,2], Zihao Gao[1,2], Long Ma[1,2], Chuanzhen Huang[1,3] ([1]*Sch. of Mech. Eng., Shandong Univ.*, [2]*Shenzhen Res. Inst. of Shandong Univ.*, [3]*Sch. of Mech. Eng., Yanshan Univ.*)

1SGA-7 Electric field perturbation on protein structural dynamics and its correlation with protein translocation
Prabhat Tripathi (*Dept. of Chem., Indian Inst. of Tech. (Banaras Hindu Univ.) Varanasi*)

1SGA-8 **脂質二分子膜内で会合するβシートペプチドが構築するナノポアの均一化手法の検討**
Study on β-sheet peptides in lipid bilayers for preparation of monodisperse-size nanopores
○彭 祖癸 [1], 山地 未紗 [1], 藤田 祥子 [1], 栢森 史浩 [2], 臼井 健二 [2], 川野 竜司 [1] ([1] 東京農工大学・生命工学科, [2] 甲南大学・フロンティアサイエンス学部)
Zugui Peng[1], Misa Yamaji[1], Shoko Fujita[1], Fumihiro Kayamori[2], Kenji Usui[2], Ryuji Kawano[1]
([1]*Department of Biotechnology and Life Science, Tokyo University of Agriculture and Technology*, [2]*Faculty of Frontiers of Innovative Research in Science and Technology, Konan University*)

1SHA 台湾-日本二国間シンポジウム
Taiwan-Japan Bilateral Symposium

オーガナイザー：Shang-Te Danny Hsu（Academia Sinica），中根 大介（電気通信大学）
Organizers: Shang-Te Danny Hsu (Academia Sinica), Daisuke Nakane (The Univ. of Electro-Comm.)

09:00〜11:30
H 会場（会議室 234（2 号館 3F））／Room H（Conference Room 234 (Bldg. 2, 3F)）

This symposium aims to highlight the current mainstream topics in biophysics and also explore the collaboration and development in the field of biophysics in the Taiwan-Japan region. The symposium includes young and upcoming researchers from the Biophysical Society of Taiwan and the Biophysical Society of Japan. We hope that the close in-person interaction and constructive discussions at this symposium will keep the scientific activity, and to have a significant impact on the community.

1SHA-1 **原生生物の運動と行動**
Movement and behavior of protists
○西上 幸範（北海道大学電子科学研究所）
Yukinori Nishigami (*Research Institute for Electronic Science, Hokkaido University*)

1SHA-2 Structural basis of a K11/K48-branched ubiquitin chain recognition by the human 26S proteasome

Shang-Te Danny Hsu[1,2,3], Piotr Draczkoswki[1], Yong-Sheng Wang[1,2], Ting Chen[1], Szu-Ni Chen[1], Kuen-Phon Wu[1,2] ([1]*Inst. of Biological Chemistry, Academia Sinica, Taiwan*, [2]*Inst. of Biochemical Sciences, National Taiwan Univ., Taiwan*, [3]*International Inst. for Sustainability with Knotted Chiral Meta Matter, Hiroshima Univ. Higashihiroshima, Japan*)

1SHA-3 How does alcohol stress trigger cell death in *E. coli*?

Setsu Kato (*Graduate School of Integrated Sciences for Life, Hiroshima University*)

1SHA-4 Structural insights into the molecular basis of recognition mechanism between linear polyubiquitin and the UBAN family

Yu-Chih Lo (*Department of Biotechnology and Bioindustry Sciences, National Cheng Kung University, Tainan / Taiwanese*)

1SHA-5 Cryo-EM Observation of wide range of soft-materials

Tasuku Hamaguchi[1], Keisuke Kawakami[2], Daisuke Unabara[1], Koji Yonekura[1,2,3] ([1]*Tohoku Univ., IMRAM*, [2]*RIKEN SPring-8*, [3]*RIKEN-JEOL Collaboration Center*)

1SHA-6 Structural Insights into the P, D, N-Triloop Interaction of Dual-Specificity Phosphatases (DUSPs)

Chih-Hsuan Lai[1], I-Chen Hu[1], Huai-Chia Chuang[2], Tse-Hua Tan[2], **Ping-Chiang Lyu**[1] ([1]*Institute of Bioinformatics and Structural Biology, National Tsing Hua University, Taiwan*, [2]*Immunology Research Center, National Health Research Institutes, Taiwan*)

1SJA 生体秩序を生み出す力の計測と操作

Measurement and manipulation of mechanical forces working in self-transformation of living systems

共催 学術変革領域研究（A）「生体秩序力学」

オーガナイザー：吉村 成弘（京都大学），谷本 博一（横浜市立大学）

Organizers: Shige H. Yoshimura (Kyoto Univ.), Hirokazu Tanimoto (Yokohama City Univ.)

09:00〜11:30

J 会場（会議室 141+142（1 号館 4F））／Room J（Conference Room 141+142 (Bldg. 1, 4F)）

An embryo produces cells with specific fates, forms, and functions during development. These cells are self-organized into an ordered pattern through collective interactions of biomolecules and mechanical forces at various spatio-temporal scales. We aim at developing new paradigms of the fundamental design principles of biological systems through holistic understanding of how mechanical forces elicit self-organizing feedback leading to progressive self-tuning transformation of multicellular systems. In this symposium, cutting-edge technologies needed to interrogate the mechanical processes and establish a unique model for multi-disciplinary research that harnesses expertise from biomedical sciences, engineering, mathematics, physics, and chemistry will be focused.

1SJA-1 細胞内における構造と構造の力学的関係

A physical relationship between intracellular structures

○谷本 博一（横浜市立大学理学部）

Hirokazu Tanimoto (*Department of Science, Yokohama City University*)

1SJA-2 Mechano-chemical control of directed cell migration through microtubule-focal adhesion crosstalk

Yukako Nishimura[1], Thasaneeya Kuboki[2], Satoru Kidoaki[2], Fumio Motegi[1] ([1]*IGM, Hokkaido Univ.*, [2]*IMCE, Kyushu Univ.*)

1SJA-3 **アクチン細胞骨格動態の光操作**
Optogenetic control of actin cytoskeletal dynamics
○山本 啓 [1], 山崎 陽祐 [1], 青木 一洋 [2,3,4], 宮﨑 牧人 [1,5]（[1] 理化学研究所 生命機能科学研究センター, [2] 基礎生物学研究所, [3] 生命創成探究センター, [4] 総合研究大学院大学, [5] キュリー研究所）
Kei Yamamoto[1], Yosuke Yamazaki[1], Kazuhiro Aoki[2,3,4], Makito Miyazaki[1,5] ([1]*RIKEN BDR*, [2]*National Institute for Basic Biology (NIBB)*, [3]*Exploratory Research Center on Life and Living Systems (ExCELLS)*, [4]*SOKENDAI*, [5]*Institut Curie*)

1SJA-4 Subcellular shuttling of ZO-1 coordinates collective cell migration
Sayuki Hirano[1,2], Kazuhiro Aoki[1,3], Naoto Ueno[2,3] ([1]*Explor. Res. Cent. on Life and Liv. Systs., Natl. Insts. of Nat. Scis.*, [2]*Intl. Res. Collab. Cent., Natl. Insts. of Nat. Scis.*, [3]*Natl. Inst. for Bas. Biol., Natl. Insts. of Nat. Scis.*)

1SJA-5 Hybrid scaffolds elucidate distinct roles of extracellular matrix in age-related cardiac fibroblast activation
Sun Avery Rui, **Jennifer L Young** (*Mechanobiology Institute, Biomedical Engineering Dept., National University of Singapore*)

1SJA-6 **細胞力学と遺伝子発現の複合解析**
Combined analysis of mechanical properties and transcriptome in thousands of single cells
○塩見 晃史 [1], 金子 泰洸ポール [1], 西川 香里 [1], 新宅 博文 [1,2]（[1] 理研・開拓, [2] 京都大・医生研）
Akifumi Shiomi[1], Taikopaul Kaneko[1], Kaori Nishikawa[1], Hirofumi Shintaku[1,2] ([1]*CPR, RIKEN*, [2]*LiMe, Kyoto Univ*)

1SJA-7 Stem Cell Differentiation in Confining Microenvironments
Andrew W. Holle[1,2] ([1]*Mechanobiology Institute*, [2]*National University of Singapore*)

1SLA 植物細胞のロジックとケミカル AI
Plant Cell Logic and Chemical AI

共催 学術変革領域研究（A）「分子サイバネティクス」

オーガナイザー：井上 大介（九州大学），水内 良（早稲田大学），松林 英明（東北大学）
Organizers: Daisuke Inoue (Kyushu Univ.), Ryo Mizuuchi (Waseda Univ.), Hideaki Matsubayashi (Tohoku Univ.)

09:00〜11:30
L 会場（会議室 133+134（1 号館 3F））／Room L（Conference Room 133+134 (Bldg. 1, 3F)）

Molecular cybernetics aims to develop artificial molecular information processing systems (Chemical AI) by connecting multiple molecular units that package functional molecules acting as sensors, processors, and actuators. On the other hand, plant cells have simple information processing systems without a central nervous system that may provide inspiration for the design of Chemical AI. In this symposium, molecular cybernetics researchers and plant cell biologists will discuss and explore ideas for designing chemical AI inspired by plant cells, and for applying the fundamental techniques of molecular cybernetics to plant cell research ranging from imaging to reconstruction experiments.

はじめに
Opening Remarks

1SLA-1 **植物の道管に見る細胞内パターン形成のロジック**
Intracellular patterning in plant xylem vessels
○小田 祥久（名古屋大学大学院理学研究科生命理学）
Yoshihisa Oda (*Bio Sci, Sci, Nagoya Univ*)

1SLA-2 Cell polarity linked to gravity sensing in plant gravitropism
Miyo Terao Morita[1], Takeshi Nishimura[1], Hiromasa Shikata[1], Shogo Mori[1], Yoshinori Abe[2], Takuma Hagihara[2], Masatsugu Toyota[2], Hiroshi Y. Yoshikawa[3], Takumi Higaki[4] ([1]*NIBB, NINS*, [2]*Dept. Biochem. Mol. Biol., Saitama Univ.*, [3]*Dept. Applied Physics, Osaka Univ.*, [4]*FAST, Kumamoto Univ.*)

1SLA-3 Real-time visualization of intra- and inter-plant communication
Masatsugu Toyota[1,2,3] ([1]*Dept. Biochem. Mol. Biol., Saitama Univ.*, [2]*SunRiSE, Suntory Fdn. Life Sci.*, [3]*Dept. Bot., UW-Madison*)

1SLA-4 マイクロ流体デバイスにおける細胞サイズのリポソームの多数同時整列
Simultaneous and Multiple Alignment of Cell-sized Liposomes in a Microfluidic Device
○豊田 太郎 [1,2], 章 逸汀 [1,3], 小淵 晴仁 [1], 浜田 省吾 [4], 杉山 博紀 [5], 安部 桂太 [6], 稲田 晃大 [7], 礒川 悌次郎 [7], 村田 智 [6] ([1] 東大・院総合文化, [2] 東大・生物普遍性連携研究機構, [3] 立教大・理, [4] 東工大・情報理工学院, [5] 自然科学研究機構・生命創成探究セ, [6] 東北大・院工, [7] 兵庫県立大・院工)
Taro Toyota[1,2], Yiting Zhang[1,3], Haruto Obuchi[1], Shogo Hamada[4], Hironori Sugiyama[5], Keita Abe[6], Akihiro Inada[7], Teijiro Isokawa[7], Satoshi Murata[6] ([1]*Grad. Sch. Arts Sci., Univ. Tokyo*, [2]*Univ. Biol. Inst., Univ. Tokyo*, [3]*Coll. Sci, Rikkyo Univ.*, [4]*Int. Grad. Sch. Sci. Eng., Tokyo Inst. Tech.*, [5]*ExCELLS, NINS*, [6]*Grad. Sch. Eng., Tohoku Univ.*, [7]*Grad. Sch. Eng., Univ. Hyogo*)

1SLA-5 生物発光を DNA で自在に操る
Manipulation of Bioluminescence with DNA
○葛谷 明紀（関西大・化学生命工）
Akinori Kuzuya (*Dept. Chem. Mater. Eng., Kansai Univ.*)

1SLA-6 Development of totally synthetic membrane transporters and channels
Kohei Sato (*Sch. Sci. Kwansei Gakuin Univ.*)

おわりに
Closing Remarks

1SMA 多階層からなる高次構造体ダイナミクス: 分子からオルガネラまでの動態を探る
Dynamics of multi-layered supramolecular assemblies : from molecular complexes to organelles

共催 JST/さきがけ「高次構造体」

オーガナイザー：中村 秀樹（京都大学），松尾 芳隆（東京大学）
Organizers: Hideki Nakamura (Kyoto Univ.), Yoshitaka Matsuoka (The Univ. of Tokyo)

09:00〜11:30
M 会場（会議室 431+432（4 号館 3F））／Room M（Conference Room 431+432 (Bldg. 4, 3F)）

Cells contain multi-layered supramolecular assemblies ranging from nanometer- to micrometer-scale structures such as protein complexes, RNA-protein complexes, liquid droplets, and organelles. These ordered and dynamic structures orchestrated by tons of molecules convey complex biological information to regulate various key functions in diverse biological processes. Insights into spatiotemporal dynamics of each supramolecular assembly must thus be getting important to understand the rich behaviors of cells. Accordingly, technologies to approach the dynamics of supramolecular assemblies have been explosively diversified in recent biology. In this symposium, we will invite talented early-career researchers from various relevant research fields and discuss the dynamic function of multi-layered supramolecular assemblies.

1SMA-1　翻訳停滞を解消する共翻訳的な品質管理機構
Co-translational quality control induced by translational arrest
○松尾 芳隆, 稲田 利文（東京大学医科学研究所）
Yoshitaka Matsuo, Toshifumi Inada (*Institute of Medical Science, The University of Tokyo*)

1SMA-2　1 分子イメージングで探る細胞分裂と細胞死のクロマチン動態
Chromatin dynamics in mitosis and apoptosis
○日比野 佳代 [1,2,3], 境 祐二 [4], 鐘巻 将人 [1,2], 前島 一博 [1,2]（[1] 遺伝研, [2] 総研大, [3]JST・さきがけ, [4] 京大）
Kayo Hibino[1,2,3], Yuji Sakai[4], Masato Kanemaki[1,2], Kazuhiro Maeshima[1,2] ([1]*Natl. Inst. Genet.*, [2]*SOKENDAI*, [3]*PRESTO, JST*, [4]*Kyoto Univ.*)

1SMA-3　Efficient information usage by cells – and cell biologists
Keita Kamino[1,2] ([1]*Institute of Molecular Biology, Academia Sinica*, [2]*Institute of Physics, Academia Sinica*)

1SMA-4　Activity-dependent extension of smooth endoplasmic reticulum (sER) into dendritic spines as a synaptic basis of memory consolidation
Natsumi Ageta-Ishihara[1,2], Makoto Kinoshita[3] ([1]*Dept Biomol Sci, Facul Sci, Toho Univ*, [2]*JST, PRESTO*, [3]*Grad Sch Sci, Nagoya Univ*)

1SMA-5　極微抽出―イオン化法による組織・細胞の多次元化学分布情報
Measurement of Multidimensional Chemical Distribution Information in Tissues and Cells by Ultrafine Extraction-Ionization Technique
○大塚 洋一（阪大・院理）
Yoichi Otsuka (*Grad. Sch. Sci., Osaka Univ.*)

1SMA-6　Understanding molecular behavior within membraneless organelles using molecular dynamics simulation
Eiji Yamamoto (*Dept. Sys. Des. Eng., Keio Univ.*)

2 日目（11 月 15 日（水））／Day 2（Nov. 15 Wed.）

2SAA　動的溶液環境が駆動する生体内液液相分離とアミロイド線維化
Liquid-liquid phase separation and amyloid formation driven by dynamic solution environments
共催 学術変革領域研究（B）「動的溶液環境」

オーガナイザー：菅瀬 謙治（京都大学），吉田 紀生（名古屋大学）
Organizers: Kenji Sugase (Kyoto Univ.), Norio Yoshida (Nagoya Univ.)

08:50～11:20
A 会場（展示室 211（2 号館 1F））／Room A（Exhibition Room 211 (Bldg. 2, 1F)）

In cells, the solution environment is constantly changing due to varying concentrations of chemicals, mechanical stimuli, and electric fields. In recent years, it has become evident that intrinsically disordered proteins, which do not have specific conformations, undergo liquid-liquid phase separation and amyloid fibrillization in response to the ‘dynamic’ solution environment. In this workshop, we invite researchers who are taking various approaches to the effect of dynamic solution environment on protein structure, function, and aggregation and discuss future developments.

はじめに
Opening Remarks

2SAA-1　生体分子系のための溶媒和理論の開発
Development of molecular theory of solvation for biomolecular systems
○吉田 紀生（名古屋大・情報）
Norio Yoshida (*Grad. Sch. Info., Nagoya Univ*)

2SAA-2　アミロイド β 凝集体の形成と解離の全原子分子動力学シミュレーション
All-atom molecular dynamics simulations for the formation and dissociation of amyloid-β aggregates
○奥村 久士 [1,2,3]（[1] 生命創成探究センター, [2] 分子研, [3] 総研大）
Hisashi Okumura[1,2,3] ([1]*ExCELLS*, [2]*Inst. Mol. Sci.*, [3]*SOKENDAI*)

2SAA-3　レドックス応答する人工アミロイド繊維
Redox-responsive artificial amyloid fibers
○池田 将 [1,2,3]（[1] 岐阜大・工, [2] 岐阜大・iGCORE, [3] 岐阜大・COMIT）
Masato Ikeda[1,2,3] ([1]*Faculty of Eng., Gifu Univ.*, [2]*iGCORE, Gifu Univ.*, [3]*COMIT, Gifu Univ.*)

2SAA-4　RNA グアニン四重鎖は α-シヌクレインの液-固相転移を誘導する
RNA G-quadruplexes provide a scaffold for the liquid–solid phase transition of α-synuclein
○松尾 和哉 [1], 矢吹 悌 [1,2], 塩田 倫史 [1,2]（[1] 熊本大・発生研・ゲノム神経, [2] 熊本大・薬学部）
Kazuya Matsuo[1], Yasushi Yabuki[1,2], Norifumi Shioda[1,2] ([1]*Dept. Genomic Neurology, Inst. Molecular Embryology and Genetics, Kumamoto Univ.*, [2]*Grad. Sch. Pharmaceut. Sci., Kumamoto Univ.*)

2SAA-5　Sup35NM 濃縮相からのアミロイド核生成の速度論的解析
Kinetic analysis of amyloid nucleation in Sup35NM condensates
○福山 真央（東北大・多元研）
Mao Fukuyama (*IMRAM, Tohoku Univ,*)

2SAA-6　Evaluation of intrinsically-disordered protein self-condensation inside living cells
Hideki Nakamura[1,2], Kaori Farnè[2] ([1]*Hakubi Center, Kyoto Univ.*, [2]*Grad. Sch. Eng., Kyoto Univ.*)

2SAA-7　ハイドロトロープとしての ATP の作用機序
Mechanism of ATP function as a hydrotrope
西澤 茉由 [2], ヴァリンダ エリック [3], 森本 大智 [2], コーン ベンジャミン [4],
シェーラー ウルリッヒ [4], 白川 昌宏 [2], ○菅瀬 謙治 [1,2]（[1] 京大・農学, [2] 京大・工学, [3] 京大・医学, [4]IPF Dresden）
Mayu Nishizawa[2], Erik Walinda[3], Daichi Morimoto[2], Benjamin Kohn[4], Ulrich Scheler[4],
Masahiro Shirakawa[2], **Kenji Sugase[1,2]** ([1]*Grad. Sch. Ag., Kyoto Univ.*, [2]*Grad. Sch. Eng., Kyoto Univ.*, [3]*Grad. Sch. Med., Kyoto Univ.*, [4]*IPF Dresden*)

おわりに
Closing Remarks

2SBA　トア複合体による細胞応答の仕組みを理解する
Uncovering the mechanisms of cell response by TOR complexes

オーガナイザー：小杉 貴洋（分子科学研究所），中津海 洋一（名古屋市立大学）
Organizers: Takahiro Kosugi (IMS), Hirokazu Nakatsumi (Nagoya City Univ.)

08:50〜11:20
B 会場（展示室 212（2 号館 1F））／Room B（Exhibition Room 212 (Bldg. 2, 1F)）

Response of cells for environments is one of the interesting topics in biology. Target of Rapamycin (TOR) complexes play central roles on signaling pathways for cells to appropriately respond to change in their environment, such as nutritional status, and also known to be associated with various diseases. To uncover the mechanisms, a variety of approach for cells of various species will be of crucial importance. In this symposium, by inviting talented early-career researchers in various research fields who are developing cutting-edge approaches to research the function of TOR complexes, we would like to introduce new attractive target to the Biophysical Society of Japan.

はじめに
Opening Remarks

2SBA-1 mTOR による液ー液相分離制御と翻訳調節
mTOR-dependent Regulation of Liquid-Liquid Phase Separation and Translation
○中津海 洋一 [1], 白根 道子 [1], 中山 敬一 [2]（[1] 名古屋立大・院薬学, [2] 九大・生医研）
Hirokazu Nakatsumi[1], Michiko Shirane[1], Keiichi I. Nakayama[2] ([1]*Grad. Sch. Pharm. Sci., Nagoya City Univ.*, [2]*Med. Inst. Bioreg., Kyushu Univ.*)

2SBA-2 Making TOP mRNA a Top Priority: Unraveling the Regulation of Protein Synthesis Machinery through Poly(A) Tail Dynamics
Koichi Ogami[1,2], Shin-ichi Hoshino[2] ([1]*Grad. Sch. Med., Nagoya University*, [2]*Grad. Sch. Pharm. Sci., Nagoya City University*)

2SBA-3 Analysis of TOR pathways regulating the initiation of sexual differentiation in fission yeast
Yoko Otsubo, Akira Yamashita (*Nat. Inst. Basic Biology*)

2SBA-4 TOR 活性と PKA 活性測定センサーの開発による分裂酵母の栄養源感知システムの解明
Development of biosensors for measuring TOR and PKA activity to elucidate the nutrition sensing system in fission yeast
○後藤 祐平 [1,2], 酒井 啓一朗 [2], 鎌田 芳彰 [1], 大坪 瑶子 [1], 山下 朗 [1], 青木 一洋 [1,2]（[1] 基生研, [2] 生命創成探究センター）
Yuhei Goto[1,2], Keiichiro Sakai[2], Yoshiaki Kamada[1], Yoko Otsubo[1], Akira Yamashita[1], Kazuhiro Aoki[1,2] ([1]*NIBB*, [2]*ExCELLs*)

2SBA-5 細胞周期依存的な mTORC1/S6K 活性化の可視化
Visualization of cell cycle-dependent mTORC1/S6K activation
○小松 直貴, 宮脇 敦史（理研・脳センター）
Naoki Komatsu, Atsushi Miyawaki (*RIKEN CBS*)

2SBA-6 Pib2 はシステインを直接感知し TORC1 活性を制御する
Pib2 is a cysteine sensor for the regulation of TORC1 activity
○荒木 保弘, 曽 慶忠, 野田 健治（大阪大学・院歯学）
Yasuhiro Araki, Qingzhong Zeng, Takeshi Noda (*Grad. Sch. Dent., Osaka Univ.*)

2SBA-7 構造モデルに基づいて酵母トア複合体を改造し、その役割を明らかにすることを目指して
Toward understanding role of yeast Tor complexes by structure-based engineering approach
○小杉 貴洋 [1,2,3,4]（[1] 自然科学・分子研・協奏分子, [2] 自然科学・生命創成, [3] 総研大, [4]JST・さきがけ）
Takahiro Kosugi[1,2,3,4] ([1]*CIMoS, IMS, NINS*, [2]*ExCELLS, NINS*, [3]*SOKENDAI*, [4]*PRESTO, JST*)

おわりに
Closing Remarks

2SCA　多彩なアプローチによるイオンチャネル研究
Invitation to Ion Channel Research

オーガナイザー：川鍋 陽（香川大学），細島 頌子（名古屋工業大学）
Organizers: Akira Kawanabe (Kagawa Univ.), Shoko Hososhima (Nagoya Inst. of Tech.)

08:50〜11:20
C 会場（会議室 221（2 号館 2F））／Room C（Conference Room 221 (Bldg. 2, 2F)）

Ion channels are a large and diverse group of membrane proteins that can open and close in response to various stimuli such as membrane potential, ligand, pH and light. Thus, ion channels play an essential role in signal transduction in nerve, muscle and brain by regulating the electrical activity of cells. Recently, many types of ion channels including channelrhodopsins, have been used to manipulate biological phenomena. However, many important questions about ion channels such as gating, ion selectivity and transport mechanisms, remain unresolved. In this symposium, we would like to introduce the latest and most interesting ion channel research.

はじめに
Opening Remarks

2SCA-1　円石藻ウイルスが持つヘリオロドプシンのイオン輸送メカニズム
Light-induced proton-transporting heliorhodopsins from marine giant viruses
○細島 頌子（名工大・院工）
Shoko Hososhima (*Grad. Sch. Eng., Nagoya Inst. Tech.*)

2SCA-2　アニオンチャネルロドプシンの細胞内ドメインの知られざる役割
Unknown role of the extended cytoplasmic domain of anion channelrhodopsin
○大木 優也 [1], 篠根 司 [1], 猪子 咲陽 [2], 須藤 未羽 [2], 出村 誠 [1,2,3], 菊川 峰志 [1,2,3], 塚本 卓 [1,2,3] ([1] 北海道大学大学院生命科学院, [2] 北海道大学理学部生物科学科高分子機能学, [3] 北海道大学大学院先端生命科学研究院）
Yuya Ohki[1], Tsukasa Shinone[1], Sayo Inoko[2], Miu Sudo[2], Makoto Demura[1,2,3], Takashi Kikukawa[1,2,3], Takashi Tsukamoto[1,2,3] ([1]*Graduate School of Life Science, Hokkaido University*, [2]*Division of Macromolecular Functions, Department of Biological Science, School of Science, Hokkaido University*, [3]*Faculty of Advanced Life Science, Hokkaido University*)

2SCA-3　イオン透過性のアクアポリン 6 は大きな単位コンダクタンスをもち、酸性溶液と中性溶液でアニオンとカチオンに対する選択性が変化する
Ion-permeable Aquaporin 6 has a large unitary conductance and changes selectivity for anion and cation in acidic and neutral solutions
○真木 孝尚 [1], 老木 成稔 [2], 岩本 真幸 [1]（[1] 福井大・医・分子神経科学, [2] 福井大・高エネ研）
Takahisa Maki[1], Shigetoshi Oiki[2], Masayuki Iwamoto[1] ([1]*Dept. Mol. Neurosci., Facul. Med. Sci., Univ. Fukui*, [2]*Biomed. Imaging Res. Center, Univ. Fukui*)

2SCA-4　電位依存性プロトンチャネルの機能制御
Functional regulation of the voltage-gated proton channel
○川鍋 陽, 藤原 祐一郎（香川大・医）
Akira Kawanabe, Yuichiro Fujiwara (*Fac. Med., Kagawa Univ.*)

2SCA-5　非天然蛍光アミノ酸 Anap をプローブとして用いた電位感受性酵素 VSP の分子機構解明
Analysis of molecular mechanism of voltage-sensing phosphatase (VSP) probed by a fluorescent unnatural amino acid
○水谷 夏希, 岡村 康司（阪大・院医・統合生理）
Natsuki Mizutani, Yasushi Okamura (*Integrative Physiol., Grad. Sch. Med., Osaka Univ.*)

2SCA-6　**電位依存性カリウムチャネル複合体の相互作用面に導入されたアミノ酸残基のサイズが機能修飾に及ぼす影響**
Functional impact of the size of introduced amino acid residues at the interaction face of voltage-gated K^+ channel complexes
○糟谷 豪, 中條 浩一（自治医科大学医学部生理学講座統合生理学部門）
Go Kasuya, Koichi Nakajo (*Division of Integrative Physiology, Department of Physiology, Jichi Medical University*)

2SDA　微生物運動研究の最前線
Frontiers of Microbial Movement Research

オーガナイザー：南野 徹（大阪大学），宮田 真人（大阪公立大学）
Organizers: Tohru Minamino (Osaka Univ.), Makoto Miyata (Osaka Metro. Univ.)

08:50〜11:20
D 会場（会議室 222+223（2 号館 2F））／Room D（Conference Room 222+223 (Bldg. 2, 2F)）

Microorganisms use their own motility apparatus to move in a variety of environments. The motility apparatus is a highly dynamic and robust protein complex containing motor proteins that convert electrochemical or chemical energy to mechanical action for movement. Because motor-protein complexes are under the control of complex sensory signal transduction networks, microorganisms can migrate towards environments favourable for survival and away from unfavourable environments. Furthermore, motor-protein complexes autonomously adjust their mechanical functions in response to environmental changes. In this symposium, we would like to discuss the molecular mechanisms behind these processes and to clarify the design principles common to seemingly diverse motility.

はじめに
Opening Remarks

2SDA-1　**細菌べん毛の III 型分泌システムにおけるプロトン-タンパク質アンチポーター機構**
Proton-protein antiporter mechanism in the type III secretion system of the bacterial flagellum
○南野 徹 [1], 木下 実紀 [1], 難波 啓一 [1,2,3]（[1] 阪大・生命機能, [2] 阪大・日本電子 YOKOGUSHI 協働研究所, [3] 理研・SPring-8）
Tohru Minamino[1], Miki Kinoshita[1], Keiichi Namba[1,2,3] ([1]*Grad. Sch. Frontier Biosci., Osaka Univ.*, [2]*JEOL YOKOGUSHI, Osaka Univ.*, [3]*RIKEN SPring-8*)

2SDA-2　**細菌の行動展示**
Behavioral exhibition of bacteria
○中根 大介（電通大・院情報理工）
Daisuke Nakane (*Grad. Sch. Info. Eng., UEC*)

2SDA-3　**らせん形細菌スピロヘータの生物物理学**
Biophysics of spirochetes
○中村 修一（東北大・院工・応物）
Shuichi Nakamura (*Dept. Appl. Phys., Grad. Sch. Eng., Tohoku Univ.*)

2SDA-4　**ミニマル細菌に構築された細菌アクチン MreB による最小の細胞運動メカニズム**
Mechanism of minimal cell motility by bacterial actin MreBs reconstructed in a minimal bacterium
○木山 花 [1], 柿澤 茂行 [2], 高橋 大地 [1], 宮田 真人 [1,3]（[1] 大阪公大・院理, [2] 産総研・生物プロセス, [3] 大阪公大・複合先端）
Hana Kiyama[1], Shigeyuki Kakizawa[2], Daichi Takahashi[1], Makoto Miyata[1,3] ([1]*Grad. Sch. Sci., Osaka Metropolitan Univ.*, [2]*Bioproduction Res. Inst., AIST*, [3]*OCARINA, Osaka Metropolitan Univ.*)

2SDA-5　細胞性粘菌の単細胞と多細胞体におけるシグナル伝達の可視化
Visualization of signal transduction in unicellular and multicellular stages of *Dictyostelium*
○森本 雄祐 [1,2]（[1] 九工大・院情工, [2]JST さきがけ）
Yusuke V. Morimoto[1,2] ([1]*Fac. Comp. Sci. and Sys. Eng., Kyushu Inst. Tech.*, [2]*PRESTO, JST*)

おわりに
Closing Remarks

2SEA　生物物理化学が拓く生命現象の観察と操作
Biophysicochemical methods and techniques drive the observation and manipulation of the biological phenomena

オーガナイザー：須藤 雄気（岡山大学），柴田 幹大（金沢大学）
Organizers: Yuki Sudo (Okayama Univ.), Mikihiro Shibata (Kanazawa Univ.)

08:50〜11:20
E 会場（会議室 224（2 号館 2F））／Room E（Conference Room 224 (Bldg. 2, 2F)）

This symposium will focus on the observation and manipulation of biological phenomena using biophysicochemical methods and technologies. Several researchers who analyze both multiple spatial scales from molecules to organisms and multiple time scales from photoreaction to biological responses and molecular evolution will provide and discuss from various biological points of view. Specifically, high-speed atomic force microscopy (HS-AFM) (Shibata), optogenetics (Sudo), single molecule imaging (Iino), radiation imaging (Osakada), cryogenic electron microscopy (Nozawa) will be presented with the selected talk(s) from young researcher(s).

2SEA-1　高速原子間力顕微鏡により可視化された活性化状態依存的な CaMKII の構造ダイナミクス
High-speed atomic force microscopy reveals the activity-dependent structural dynamics of CaMKII
○柴田 幹大（金沢大・NanoLSI）
Mikihiro Shibata (*WPI-NanoLSI, Kanazawa Univ.*)

2SEA-2　ヒストン H2A と H2B を含まないヌクレオソーム様複合体の構造機能解析
Functional and structural analysis reveal a nucleosome-like particle without histones H2A and H2B
○野澤 佳世 [1], 胡桃坂 仁志 [2]（[1] 東京工業大学・生命理工学院, [2] 東京大学・定量生命科学研究所）
Kayo Nozawa[1], Hitoshi Kurumizaka[2] ([1]*Tokyo Institute of Technology, School of Life Science and Technology*, [2]*The University of Tokyo, Institute for Quantitative Biosciences*)

2SEA-3　生物発光を用いて植物体内の温度をオルガネラレベルで高感度に可視化する温度センサーの開発
A highly sensitive bioluminescent thermosensor to capture the plant temperature at the organelle level
○福島 俊一 [1], 佐藤 智亮 [1], 長部 謙二 [2], 永井 健治 [1]（[1] 大阪大・産業科学研究所, [2] 沖縄科学技術大学院大学）
Shun-ichi Fukushima[1], Tomoaki Sato[1], Kenji Osabe[2], Takeharu Nagai[1] ([1]*SANKEN, Univ. Osaka*, [2]*OIST*)

2SEA-4　バイオサイエンスへの応用を目指した高機能性光・放射線応答性有機ナノ材料の開発
Development of functional light- and radiation-responsive organic nanomaterials for bioscience applications
○小阪田 泰子 [1,2]（[1] 大阪大学高等共創研究院, [2] 大阪大学産業科学研究所）
Yasuko Osakada[1,2] ([1]*Osaka university, IACS*, [2]*Osaka university, SANKEN*)

2SEA-5　分子モーターの 1 分子イメージングとエンジニアリング
Single-molecule imaging and engineering of molecular motors
○飯野 亮太 [1,2]（[1] 自然科学研究機構 分子科学研究所, [2] 総研大）
Ryota Iino[1,2] ([1]*Institute for Molecular Science, NINS*, [2]*SOKENDAI*)

2SEA-6　微生物ロドプシンの多機能性と光遺伝学ツール
Multifunctional microbial rhodopsins and their applications in optogenetics
○須藤 雄気（岡山大院医歯薬）
Yuki Sudo (*Okayama Univ.*)

2SFA　生命と物質の境界探査
Exploring the boundary between life and matter

共催 生命創成探究センター「先端共創プラットフォーム」

オーガナイザー：村田 和義（生命創成探究センター），
荒川 和晴（慶應義塾大学/生命創成探究センター）
Organizers: Kazuyoshi Murata (ExCELLS), Kazuharu Arakawa (Keio Univ./ExCELLS)

08:50〜11:20
F 会場（会議室 231（2 号館 3F））／Room F（Conference Room 231 (Bldg. 2, 3F)）

Understanding the morphology, function, and dynamics of genomes and molecular complexes of individual extremophiles is progressing as survival strategies in various extreme environments. On the other hand, a metagenomic-based exploration of more extreme environments reveals the importance not only of independent survival strategies of individual organisms but also of cooperative survival strategies through interactions between coexisting heterologous organisms. This project will observe the molecular complexes of morphology, function, dynamics, and their associated biological interactions of viruses, prokaryotes, and eukaryotes living in extreme environments, and elucidate the simple or minimal mechanisms and principles. We will connect these to a systematic understanding of the boundary between matter and life.

はじめに
Opening Remarks

2SFA-1　リボソーム自己複製プロセスの構成的理解による物質と生命の境界探査
Exploring the boundary between matter and life through a constitutive understanding of the ribosomal self-replication process
○青木 航（阪大・工）
Wataru Aoki (*Grad. Sch. Eng*)

2SFA-2　Construction of model catalytic proteins to investigate the origin of prebiological catalyses
Koki Makabe[1,2] ([1]*Yamagata Univ.*, [2]*PRESTO*)

2SFA-3　Life-without-water -Shining tardigrades illuminate the way to exploring the mechanism of dehydrated ametabolic state-
Sae Tanaka[1,2], Kazuharu Arakawa[1,2] ([1]*ExCELLS, NINS*, [2]*IAB, Keio Univ.*)

2SFA-4　メドゥーサウイルスにコードされるヒストンの宿主細胞内でのウイルス複製における役割について
Role of medusavirus-encoded histones in viral replication in host cells
○武村 政春 [1], 東浦 彰史 [2], 村田 和義 [3]（[1] 東京理科大・院理, [2] 広島大・院医, [3] 自然科学研究機構・ExCELLS）
Masaharu Takemura[1], Akifumi Higashiura[2], Kazuyoshi Murata[3] ([1]*Grad. Sch. Sci., Tokyo Univ. Sci.*, [2]*Grad. Sch. Med., Hiroshima Univ.*, [3]*Res. Inst. Nat. Sci., ExCELLS*)

2SFA-5 Dynamic change of mechanical properties of bacteria investigated by high-speed AFM based force mapping
Christian Ganser[1], Shigetaka Nishiguchi[1,2], Takayuki Uchihashi[1,3] ([1]*National Institutes of Natural Sciences, ExCELLS*, [2]*Osaka University, Department of Biotechnology (present affiliation)*, [3]*Nagoya University, Department of Physics*)

2SFA-6 Unraveling the Mechanisms of Desiccation Tolerance: Insights from Anhydrobiotic Tardigrade CAHS1 Fibrous Condensates
Maho Yagi-Utsumi[1,2], Koichi Kato[1,2] ([1]*ExCELLS, NINS*, [2]*Grad. Sch. Pharm. Sci., Nagoya City Univ.*)

2SFA-7 微生物ダークマターを通じて生命—物質の境界を明らかにするために
Unveiling the boundary between life and matter via the exploration of microbial dark matter
○武藤 久（自然科学研究機構・生命創成探究センター）
Hisashi Muto (*ExCELLS, NINS*)

おわりに
Closing Remarks

2SGA 生命機能の制御を可能にする圧力バイオロジーの開拓
Pressure stimuli regulate the biological functions

オーガナイザー：森松 賢順（岡山大学），西山 雅祥（近畿大学）
Organizers: Masatoshi Morimatsu (Okayama Univ.), Masayoshi Nishiyama (Kindai Univ.)

08:50〜11:20
G 会場（会議室 232+233（2 号館 3F））／Room G（Conference Room 232+233 (Bldg. 2, 3F)）

Various "pressure stimuli" such as hydrostatic pressure, osmotic pressure, and compressive force regulate a variety of biological functions from the molecular system to the tissue level. Recent studies have shown that pressure stimulus signaling elicits a wide range of cellular responses, providing new insights into biological and biomedical research areas. In this symposium, we will present and discuss recent studies on how pressure stimuli regulate biological function. We will also introduce the emerging field of Pressure Biology.

はじめに
Opening Remarks

2SGA-1 Comparison of Pressure Responses Among Piezo-sensitive and Piezophilic Bacteria
Douglas H. Bartlett (*Scripps Inst. Oceanography, UCSD / USA*)

2SGA-2 酵母のメカノセンシングと高水圧ストレス応答
Mechanosensing and Cellular Responses to High Hydrostatic Pressure in Yeast
○阿部 文快（青山学院大・理工）
Fumiyoshi Abe (*Coll. Sci. Eng., Aoyama Gakuin Univ.*)

2SGA-3 Hydrostatic pressure stimuli regulate the pattern of the intracellular calcium concentration
Masatoshi Morimatsu (*Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University*)

2SGA-4 減圧力顕微鏡法
Depressurization microscopy
○西山 雅祥（近大理工）
Masayoshi Nishiyama (*KINDAI Univ.*)

2SGA-5 Hypotonic Pressure Induced Osmotic Calcium Response States
Zidan Gao, Masatoshi Morimatsu (*Cardiovascular Phsiology,Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University*)

2SGA-6 **表皮癌細胞の増殖の機械的調節における細胞—細胞間接着と細胞—基質間接着の異なる役割**
Distinct roles of cell-cell and cell-ECM adhesions in mechanical regulation of epidermal cancer cell proliferation
Hiroaki Hirata[1,2], Oleg Dobrokhotov[2,3], Masahiro Sokabe[2,4] ([1]*Dep. Appl. Biosci., Kanazawa Inst. Tech.*, [2]*Mechanobiol., Grad. Sch. Med., Nagoya Univ.*, [3]*Randall Centre Cell Mol. Biophys., King's College London*, [4]*Human Info. Sys. Lab., Kanazawa Inst. Tech.*)

おわりに
Closing Remarks

2SHA シミュレーションで迫る膜輸送体の新知見
New insight into membrane transport proteins by simulation studies

オーガナイザー：炭竈 享司（JST さきがけ），岡崎 圭一（分子科学研究所）
Organizers: Takashi Sumikama (PRESTO, JST), Kei-ichi Okazaki (IMS)

08:50〜11:20
H 会場（会議室 234（2 号館 3F））／Room H（Conference Room 234 (Bldg. 2, 3F)）

Membrane transport proteins play essential roles in many physiological functions, such as maintenance of concentration gradients, nerve conductions, and synthesis of ATP. In principle, molecular motion should be involved in these functions, and observation of such molecular motion is necessary to fully understand their mechanisms. Recent computational simulations using high-performance computers have made it possible to fundamentally explain such functions at the molecular level. In this symposium, we will present recent advances in this field that help us understand (1) ion conduction and selectivity mechanism through the ion channels, (2) those through the ion pumps, (3) alternating-access conformational dynamics of transporters.

2SHA-1 **K^+チャネルでの選択的イオン透過と Na^+チャネルのゲーティングの新機構**
Selective ion permeation through the K^+ channels and novel gating mechanism of the Na^+ channel
○炭竈 享司 [1,2]（[1] さきがけ, JST, [2] 金沢大学）
Takashi Sumikama[1,2] ([1]*PRESTO, JST*, [2]*Kanazawa University*)

2SHA-2 Principles of selective transport in ion channels and nanopores
Ben Corry (*Research School of Biology, Australian National University*)

2SHA-3 **量子分子動力学シミュレーションによるロドプシンにおける化学反応の理論的解析**
Quantum molecular dynamics simulation studies for reactions in rhodopsin proteins
○小野 純一（早稲田大学 理工学術院総合研究所）
Junichi Ono (*Waseda Research Institute for Science and Engineering (WISE), Waseda University*)

2SHA-4 **分子動力学（MD）法による SR-Ca^{2+}-ATPase の E1P-E2P 転移での構造変化解析**
Molecular dynamics (MD) simulations of structural changes in the E1P-E2P transition of SR-Ca^{2+}-ATPase
○小林 千草 [1], 稲葉 謙次 [2], 杉田 有治 [1,3,4]（[1] 理研・R-CCS, [2] 東北大・院多元物質科学, [3] 理研・CPR, [4] 理研・BDR）
Chigusa Kobayashi[1], Kenji Inaba[2], Yuji Sugita[1,3,4] ([1]*RIKEN R-CCS*, [2]*IMRAM, Tohoku Univ.*, [3]*RIKEN CPR*, [4]*RIKEN BDR*)

2SHA-5 **分子シミュレーションと AlphaFold2 によるトランスポータータンパク質の構造ダイナミクス解明**
Conformational dynamics of transporter proteins revealed by molecular simulation and AlphaFold2
○岡崎 圭一（分子科学研究所）
Kei-ichi Okazaki (*Institute for Molecular Science*)

2SIA The third Japan-U.S. symposium on motor proteins and associated single-molecule biophysics

オーガナイザー：島 知弘（東京大学），林 久美子（東京大学）
Organizers: Tomohiro Shima (The Univ. of Tokyo), Kumiko Hayashi (The Univ. of Tokyo)

08:50〜11:20
I 会場（国際会議室（3 号館 3F））／Room I（International Conference Room (Bldg. 3, 3F)）

This is a series of motor protein symposia, starting in 2021, that will bring together researchers from Japan and the U.S.-two leading countries in the field- to foster the exchange of ideas and promote cutting-edge collaborative research. With a lineup of renowned experts in the field, this symposium provides an exceptional opportunity to present the latest advances in our understanding of motor protein movement and regulation. This time, we are especially featuring international young scientists as speakers who are also willing to contribute to the educational programs of IUPAB2024. In addition, the symposium will promote gender equality by providing an opportunity for discussion as part of the introduction of the speakers.

はじめに
Opening Remarks

2SIA-1 **生体分子モーターからなるアクティブマターを用いた物理リザーバー演算装置の構築**
Construction of a physical reservoir computing device using active matter made from a swarm of biomolecular motors
○龔 逸鳴 [1], 臼杵 義亨 [2], コビル アリフ ムハンマド ラセドウル [3], 佐田 和己 [2,3], 川又 生吹 [4], オベル加藤 ナタナエル [5], 市川 正敏 [1], 角五 彰 [1]（[1] 京大・院理, [2] 北大・院総化, [3] 北大・院理, [4] 東北大・院工, [5] お茶大・情報理）
Yiming Gong[1], Gikyo Usuki[2], Arif Md. Rashedul Kabir[3], Kazuki Sada[2,3], Ibuki Kawamata[4], Nathanael Aubert-Kato[5], Masatoshi Ichikawa[1], Akira Kakugo[1] ([1]*Grad. Sch. Sci., Kyoto. Univ*, [2]*Grad. Sch. Che. Sci. Eng., Hokkaido. Univ*, [3]*Fac. Sci, Hokkaido. Univ*, [4]*Grad. Sch. Eng., Tohoku. Univ*, [5]*Dep. Infor. Sci., Ochanomizu. Univ*)

2SIA-2 Kinesin-1, 2 and 3 motors use family-specific mechanochemical strategies to effectively compete with dynein during bidirectional transport
William Hancock[1,2], Allison Gicking[1], Tzu-Chen Ma[1], Qingzhou Feng[1], Rui Jiang[1], Somayesadat Badieyan[3], Michael Cianfrocco[3] ([1]*Department of Biomedical Engineering, Pennsylvania State University*, [2]*Department of Chemistry, Pennsylvania State University*, [3]*Department of Biological Chemistry and the Life Sciences Institute, University of Michigan*)

2SIA-3 Plant KIF15 functions as a vesicle transporter for the cell plate formation during cytokinesis
Takema Sasaki, Gohta Goshima, **Moe Yamada** (*Grad. Sch. Sci., Nagoya Univ.*)

2SIA-4 TRAK adaptors regulate the recruitment and activation of dynein and kinesin in mitochondrial transport
Merve Aslan[1], John Canty[1], Andrew Hensley[2], Amanda Jack[1], Ahmet Yildiz[1,2,3] ([1]*Biophysics Graduate Group, UC Berkeley*, [2]*Physics Department, UC Berkeley*, [3]*Department of Molecular and Cellular Biology, University of California at Berkeley*)

2SIA-5 Alphaherpesvirus neuroinvasion is achieved by regulation of the kinesin-1 microtubule motor
Gregory Allan Smith (*Northwestern Univ. Feinberg Sch. Med.*)

2SIA-6 Extreme-Value Analysis of Intracellular Cargo Transport by Motor Proteins
Kumiko Hayashi (*ISSP, Univ. Tokyo*)

2SJA 時間タンパク質学
Chronoproteinology

共催 学術変革領域研究（B）「時間タンパク質学」

オーガナイザー：吉種 光（東京都医学総合研究所），大出 晃士（東京大学）
Organizers: Hikari Yoshitane (TMIMS), Koji Ode (The Univ. of Tokyo)

08:50〜11:20
J 会場（会議室 141+142（1 号館 4F））／Room J（Conference Room 141+142 (Bldg. 1, 4F)）

There are various time scales in biology such as longevity, seasonal responses, circadian rhythmicity, developmental processes, cell division cycles, and heartbeats. In other words, living organisms consists of different time scales. What are the mechanisms for measuring “time” that correspond to each event at different time scale? This symposium is co-organized with Transformative Research Areas (B) "Chronoproteinology". We will focus on proteins responsible for molecular mechanisms that directly regulate time information. The physical properties and dynamics of proteins could generate “time” on various time scales as autonomous protein oscillators. The dynamics includes protein-protein interactions, post-translational modifications, enzymatic activities, and conformational changes.

はじめに
Opening Remarks

2SJA-1 時間タンパク質学:時計タンパク質の相互作用リズムと翻訳後修飾コード
Chrono-proteinology: circadian interaction rhythms of clock proteins and chrono-code of their post-translational modifications
○吉種 光（東京都医学総合研究所）
Hikari Yoshitane (*Tokyo Metropolitan Institute of Medical Science*)

2SJA-2 時計タンパク質の翻訳後修飾による概日時計の駆動機構
Timekeepers of the mammalian circadian clock regulate post-translational modifications
○篠原 雄太（北海道大学 遺伝子病制御研究所）
Yuta Shinohara (*Inst. for Genetic Medicine, Hokkaido univ.*)

2SJA-3 温度依存的な時計関連タンパク質の量的制御は周期の温度補償性と関連する
The temperature-dependent quantitative control of the clock proteins is associated with temperature compensation in Arabidopsis thaliana
○前田 明里, 松尾 宏美, 中道 範人（名古屋大学大学院 生命農学研究科）
Akari Maeda, Hiromi Matuo, Norihito Nakamichi (*Grad. Sch. Bio-Agric., Nagoya Univ.*)

2SJA-4 ニワトリクリプトクロム 1 変異体における FAD 結合の増強と光反応サイクル
Enhanced FAD-binding and photocycle in a chicken cryptochrome 1 mutant
○石塚 皓貴, 三浦 宏太, 岡野 恵子, 岡野 俊行（早稲田大・院先進理工・電生）
Koki Ishizuka, Kota Miura, Keiko Okano, Toshiyuki Okano (*Dept. Elec. Eng., Grad. Sch. ASE., Waseda Univ.*)

2SJA-5 **細胞の中のリズム：その細胞自律性と非自律性**
Circadian rhythms in a cell: cell-autonomous and non-cell-autonomous
○村中 智明[1], 小山 時隆[2]（[1] 名古屋大・院生命農学, [2] 京都大・院理学）
Tomoaki Muranaka[1], Tokitaka Oyama[2] ([1]*Grad. Sch. of Bioagri. Sci., Nagoya Univ.*, [2]*Grad. Sch. of Sci., Kyoto Univ.*)

2SJA-6 **緑藻から探る非転写概日振動体**
Exploring non-transcriptional circadian oscillators from green algae
○松尾 拓哉（北里大・院理学）
Takuya Matsuo (*Grad. Sch. Sci., Univ. Kitasato*)

2SJA-7 **概年時計の分子基盤**
Molecular basis of the circannual clock
○吉村 崇[1,2]（[1] 名大・WPI-ITbM, [2] 名大・院生命農学）
Takashi Yoshimura[1,2] ([1]*WPI-ITbM, Nagoya Univ.*, [2]*Grad. Sch. Bioagricult. Sci., Nagoya Univ.*)

おわりに
Closing Remarks

2SKA 基礎生物科学からベンチャーを起こそう！
Venture out of basic bioscience!

オーガナイザー：永井 健治（大阪大学），渡邉 朋信（広島大学）
Organizers: Takeharu Nagai (Osaka Univ.), Tomonobu Watanabe (Hiroshima Univ.)

08:50〜11:20
K 会場（会議室 131+132（1 号館 3F））／Room K（Conference Room 131+132 (Bldg. 1, 3F)）

The social implementation of academic research is expected to not only promote positive-feedback between basic science and industry/society but also provide new career paths for young researchers. Therefore, venture entrepreneurship from basic bioscience including biophysics can be a savior of Japan with a growing concern about the decline of scientific capabilities. In this symposium we would like to discuss the social implementation of basic bioscience from various viewpoints so as to encourage entrepreneurship among biophysicists, especially graduate students and young researchers. We hope audiences will see that basic science also has ample potential to venture out into a successful business/career.

はじめに
Opening Remarks

2SKA-1 **DNA 複製純粋研究からのオリシロ起業、売却**
A journey of OriCiro from academia research to M&A exit
○末次 正幸[1,2]（[1] 立教大・理, [2] モデルナ・エンザイマティクス株式会社）
Masayuki Suetsugu[1,2] ([1]*Col. of Sci., Rikkyo Univ.*, [2]*Moderna Enzymatics Co., Ltd.*)

2SKA-2 **セツロテックを起業した 3 つの理由**
Three reasons I started my business “Setsurotech”
○竹本 龍也[1,2]（[1] 徳島大学先端酵素学研究所/, [2] 株式会社セツロテック）
Tatsuya Takemoto[1,2] ([1]*Institute of Advanced Medical Sciences, Tokushima University*, [2]*Setsuro tech Inc.*)

2SKA-3　VC から見た基礎生物学スタートアップの最前線
The Forefront of Basic Biology Startups from a VC's Perspective
○山家 創（リアルテックホールディングス（株））
Sou Yanbe (*Real Tech Holdings Co.,Ltd.*)

2SKA-4　生きたままの試料を分子分光するスクリーニング技術：多点同時ラマンプレートリーダー
Screening Technique for Molecular Spectroscopy of Live Samples: Multi-Point Simultaneous Raman Plate Reader
○畔堂 一樹 [1,2]（[1] 大阪大学, [2] 産業技術総合研究所）
Kazuki Bando[1,2] ([1]*Osaka University*, [2]*National Institute of Advanced Industrial Science and Technology (AIST)*)

2SKA-5　アカデミアからベンチャーへー若手生物学研究者に伝えたいこと
From Academia to the Venture Company- A Message to Young Biologists
○髙橋 政代（株式会社ビジョンケア）
Masayo Takahashi (*Vision Care Inc.*)

2SKA-6　若者だけじゃない！ オジサンも起業する！！
Not just the youth! Older men are also becoming entrepreneurs!!
○永井 健治（阪大・産研）
Takeharu Nagai (*SANKEN, Osaka Univ.*)

2SKA-7　「生もの」生物物理学
"Raw foods" biophysics
○渡邉 朋信 [1,2]（[1] 広大・原医研, [2] 理研・神戸）
Tomonobu Watanabe[1,2] ([1]*RIRBM, Hiroshima Univ.*, [2]*BDR, Riken*)

おわりに
Closing Remarks

2SLA　“タンパク質ファイバー”が生み出す自主・自発の階層と適応：生物物理学からの“健康創発科学”
"Protein Fibers" Generate Voluntary and Spontaneous Hierarchies and Adaptations: "Health Emergence Science" from Biophysics

オーガナイザー：跡見 順子（東京農工大学），岩城 光宏（情報通信研究機構）
Organizers: Yoriko Atomi (Tokyo Univ. of Agric. & Tech.), Mitsuhiro Iwaki (NICT)

08:50〜11:20
L 会場（会議室 133+134（1 号館 3F））／Room L（Conference Room 133+134 (Bldg. 1, 3F)）

Fumio Osawa, founder of the Biophysical Society, insightfully observed that the essence of life is "voluntary and spontaneous". The system principle that has evolved is form-dependent dynamics. Although we can raise issues from pathology, we are far from elucidating the "health principle" that allows us to live a 120-year lifespan. This symposium will explore the way to extend the principle of autonomy and spontaneity of life, which is emerged by self-association of protein fibers and led to adaptation by molecular chaperones, from molecules and cells to the physical and mental problems of human beings. We advocate health emergent science from biophysics.

はじめに
Opening Remarks

2SLA-1 微小管におけるチューブリン C 末端の動態
Dynamical state of the C-terminal tail of tubulin on the microtubule
○高野 光則（早稲田大・物理）
Mitsunori Takano (*Dept Phys & Appl Phys, Waseda Univ*)

2SLA-2 DNA メカノテクノロジーの開発と細胞の高解像力学計測
DNA mechanotechnology and high-resolution imaging of cellular mechanical forces
○岩城 光宏 [1,2,3]（[1] 情報通信・未来 ICT 研, [2] 理研・生命機能セ, [3] 阪大・免疫フロンティア）
Mitsuhiro Iwaki[1,2,3] ([1]*Adv. ICT Res. Inst., NICT*, [2]*RIKEN*, [3]*IFReC, Osaka Univ.*)

2SLA-3 サルコメア合成に向けた、細胞骨格と DNA ナノテクノロジーを融合した再構築系の探求
Exploring a Novel Reconstituted System Combining Cytoskeletons and DNA Nanotechnology Toward Sarcomere Synthesis
○井上 大介（九大・院芸工）
Daisuke Inoue (*Fac. Des., Kyushu Univ.*)

2SLA-4 理論解析による細胞の力学的ホメオスタシスのシステム論的メカニズム
Theoretical analysis of the system relation in cellular mechanical homeostasis
○松元 瑛司, 松永 大樹, 出口 真次（大阪大学大学院基礎工学研究科）
Eiji Matsumoto, Daiki Matsunaga, Shinji Deguchi (*Graduate School of Engineering Science, Osaka University*)

2SLA-5 Endothelial plasma membranes and mitochondria act as mechanosensory complexes that mediate sensing and signaling of shear stress
Kimiko Yamamoto (*Grad. Sch. Med., The Univ. Tokyo*)

2SLA-6 ヒトの生物物理学的評価の提案：健康におけるタンパク質線維の冗長性と創発性
Proposal of biophysical evaluation of human as an organism: redundancy and emergency of protein fibers in health
○跡見 順子（帝京大学先端総合研究機構）
Yoriko Atomi (*Teikyo University, ACRO*)

おわりに
Closing Remarks

2SMA 定量的な細胞力学解析による動的な生命システムの理解
Quantitative analysis of cellular mechanics to dissect dynamics of biological systems

共催 JST/JCREST「多細胞」

オーガナイザー：新宅 博文（理化学研究所），牧 功一郎（京都大学）
Organizers: Hirofumi Shintaku (RIKEN), Koichiro Maki (Kyoto Univ.)

08:50〜11:20

M 会場（会議室 232+233（2 号館 3F））／Room M（Conference Room 232+233 (Bldg. 2, 3F)）

The mechanical phenotype of cells is a key biophysical property that arises from the intracellular states at the molecular level and is associated with cellular function. In multiple cellular contexts, the mechanical phenotypes are coordinated for autonomous morphogenesis and functional maturation. In this symposium, we invite researchers from various fields, including engineering, computational biology, and basic biology, and showcase research attempts that focus on the mechanical phenotype for diagnosis purposes and for dissecting the dynamics of biological systems.

2SMA-1　筋細胞の方向を制御する生体力学的なメカニズム
DIRECTIONALITY OF DEVELOPING SKELETAL MUSCLES IS SET BY MECHANICAL FORCES
Kazunori Sunadome[11,12], Alek G Erickson[1], Delf Kah[2], Ben Fabry[2], Csaba Adori[3], Shigeaki Kanatani[4], Polina Kameneva[5], Louis Faure[5], Marketa Kaucka[6], Ivar Dehnisch Ellström[7], Marketa Tesarova[8], Tomas Zikmund[8], Jozef Kaiser[8], Steven Edwards[9], Koichiro Maki[10], Taiji Adachi[10], Takuya Yamomoto[11,12], Kaj Fried[3], Igor Adameyko[1,5] ([1]*Department of Physiology and Pharmacology, Karolinska Institutet*, [2]*Department of Physics, University of Erlangen-Nuremberg*, [3]*Department of Neuroscience, Karolinska Institutet*, [4]*Department of Medical Biochemistry and Biophysics, Division of Molecular Neurobiology, Karolinska Institutet*, [5]*Department of Neuroimmunology, Center for Brain Research, Medical University Vienna*, [6]*Max Planck Institute for Evolutionary Biology*, [7]*Spinalis Foundation*, [8]*Central European Institute of Technology, Brno University of Technology*, [9]*KTH Royal Institute of Technology*, [10]*Department of Biosystems Science, Institute for Life and Medical Sciences, Kyoto University*, [11]*Institute for the Advanced Study of Human Biology (ASHBi), Kyoto University*, [12]*Center for iPS Cell Research and Application, Kyoto University*)

2SMA-2　Mechanical behaviors of nuclear chromatin in chondrocytes under hydrostatic pressure
Koichiro Maki (*Inst. Life Med. Sci., Kyoto University*)

2SMA-3　形態形成を不可逆に進行させる上皮折りたたみの力学的可塑性
Mechanical Plasticity of Epithelial Folding for Irreversible Progression of Morphogenesis
○奥田 覚（金沢大学ナノ生命科学研究所）
Satoru Okuda (*Nano Life Science Institute, Kanazawa University*)

2SMA-4　病気を診断するために細胞を絞る
Squeezing cells to diagnose disease
Dino Di Carlo (*Department of Bioengineering, UCLA*)

2SMA-5　ナノポアエレクトロポレーションを活用した細胞表面張力と遺伝子発現の 1 細胞解析
Nanopore electroporation enables profiling cell surface tension and gene expression at single-cell resolution
○新宅 博文 [1,2], 塩見 晃史 [2], 金子 泰洸ポール [2], 西川 香里 [2]（[1] 京大・医生研, [2] 理研・開拓）
Hirofumi Shintaku[1,2], Akifumi Shiomi[2], Taikopaul Kaneko[2], Kaori Nishikawa[2] ([1]*LiMe, Kyoto Univ*, [2]*CPR, RIKEN*)

2SAP　分子の集合からシステムへ、そして生命へ：高解像な生命の起源研究
From molecules to systems, and eventually to life: high resolution Origins of Life research

オーガナイザー：Tony Z. Jia（Tokyo Tech），車 兪澈（海洋研究開発機構）
Organizers: Tony Z. Jia (Tokyo Tech), Yutetsu Kuruma (JAMSTEC)

14:00〜16:30
A 会場（展示室 211（2 号館 1F））／Room A（Exhibition Room 211 (Bldg. 2, 1F)）

Life began from a mixture of chemicals in the early Earth environment, and eventually resulted in the emergence of functional cells by passing through intermediates such as assemblies and systems. However, nearly every aspect of this historical transition leading to the emergence of life remains unsolved. In this symposium, we will highlight research focusing on each step of the origins of life, with an attempt to develop and increase the resolution of origins of life studies to more accurately reveal the step-wise transition from non-life to life.

はじめに
Opening Remarks

2SAP-1 **相分離液滴の人工細胞としての活用：細胞構造と運動の協奏**
Reproduction of cell structure and motility using cell-sized droplets in an aqueous two-phase system
○柳澤 実穂（東大総合文化・先進）
Miho Yanagisawa (*Komaba Inst., Univ. Tokyo*)

2SAP-2 Spectroscopic and Biophysical Methods to Determine Differential Salt-Uptake by Primitive Membraneless Polyester Microdroplets
Chen Chen[1,2], Ruiqin Yi[2], Motoko Igisu[3], Chie Sakaguchi[4], Rehana Afrin[2], Christian Potiszil[4], Tak Kunihiro[4], Katsura Kobayashi[4], Eizo Nakamura[4], Yuichiro Ueno[2,5], Andre Antunes[6,10], Anna Wang[7], Kuhan Chandru[8], Jihua Hao[9], Tony Z. Jia[2,10] ([1]*RIKEN Center for Sustainable Resource Science*, [2]*Earth-Life Science Institute, Tokyo Institute of Technology*, [3]*Institute for Extra-cutting-edge Science and Technology Avant-garde Research (X-star), JAMSTEC*, [4]*The Pheasant Memorial Laboratory for Geochemistry and Cosmochemistry, Okayama University*, [5]*Department of Earth and Planetary Sciences, Tokyo Institute of Technology*, [6]*State Key Laboratory of Lunar and Planetary Sciences, MUST*, [7]*School of Chemistry, UNSW Sydney*, [8]*Space Science Center (ANGKASA), National University of Malaysia*, [9]*CAS Laboratory of Crust-Mantle Materials and Environments, University of Science and Technology of China*, [10]*Blue Marble Space Institute of Science*)

2SAP-3 **凍結融解サイクルによる DNA 連結反応の効率化と生体情報分子の伸長環境への示唆**
Effective DNA hybridization via freeze-thaw cycles and implication for prebiotic formation of large information molecules
○野田 夏実 [1], 高橋 南帆 [2], 野村 浩平 [2], 橋谷 文貴 [3], 阿部 洋 [2,3,4], 松浦 友亮 [1]（[1] 東京工業大学 地球生命研究所, [2] 名古屋大学 大学院理学研究科, [3] 名古屋大学 物質科学国際研究センター, [4] 名古屋大学 統合糖鎖研究拠点 iGCORE, 糖鎖生命コア研究拠点）
Natsumi Noda[1], Naho Takahashi[2], Kohei Nomura[2], Fumitaka Hashiya[3], Hiroshi Abe[2,3,4], Tomoaki Matsuura[1] ([1]*Earth-Life Science Institute (ELSI), Tokyo Institute of Technology*, [2]*Graduate School of Science, Nagoya University*, [3]*Research Center for Material Science, Nagoya University*, [4]*Institute for Glyco-core Research (iGCORE), Nagoya University*)

2SAP-4 Protocell interaction dynamics: Implications for the survival of the 'fittest'?
Souradeep Das, **Sudha Rajamani** (*Department of Biology, IISER Pune*)

2SAP-5 **分子進化におけるアミノ酸の網羅的な変異分布の冪乗法による解析**
Power-method analysis of the exhaustive distribution of amino acid mutations in molecular evolution
○大森 環, 山中 雅則（日大・理工）
Kan Omori, Masanori Yamanaka (*CST, Nihon Univ.*)

2SAP-6 **複数のサブシステムから構成される人工細胞**
Functional expression in artificial cell system composed of multi-subsystems
○車 兪澈 [1], 江藤 澄江 [2], 松村 るみゑ [1], 嶋根 康弘 [1], ベルハヌ サミュエル [2], 笠間 健嗣 [2], 藤見 麻衣 [2]（[1] 海洋研究開発機構, [2] 東京工業大学）
Yutetsu Kuruma[1], Sumie Eto[2], Rumie Matsumura[1], Yasuhiro Shimane[1], Samuel Berhanu[2], Takeshi Kasama[2], Mai Fujimi[2] ([1]*Japan Agency for Marine-Earth Science and Technology*, [2]*Tokyo Institute of Technology*)

おわりに
Closing Remarks

2SBP　高次ゲノム構造揺らぎとその機能
Higher-order structural fluctuations in the genome and their functions

オーガナイザー：落合 博（九州大学），新海 創也（理化学研究所）
Organizers: Hiroshi Ochiai (Kyushu Univ.), Soya Shinkai (RIKEN)

14:00〜16:30
B 会場（展示室 212（2 号館 1F））／Room B（Exhibition Room 212 (Bldg. 2, 1F)）

Genomic DNA contains the information necessary for the development and maintenance of living organisms, and forms cell-type-specific higher-order structures while exhibiting dynamic behavior. Recent studies, which employ live-cell imaging and mathematical and physical simulations, have revealed that these fluctuations in higher-order genomic structure play biological roles. In this symposium, experts in the field will present their latest research findings and discuss the functions of fluctuations in higher-order genomic structures.

はじめに
Opening Remarks

2SBP-1　細胞内のユークロマチンは本当にオープン構造か？
Is euchromatin really open in the cell ?-Condensed but liquid-like domain organization of active chromatin regions in living human cells
○前島 一博 [1,2]（[1] 国立遺伝学研究所, [2] 総研大）
Kazuhiro Maeshima[1,2] ([1]*National Institute of Genetics*, [2]*SOKENDAI*)

2SBP-2　Histone FRET microscopy of live cell genome architecture
Elizabeth Hinde (*School of Physics, University of Melbourne*)

2SBP-3　Polymer physics of Hi-C data reveals linear viscoelasticity of the 3D genome
Soya Shinkai, Shuichi Onami (*RIKEN BDR*)

2SBP-4　Computer simulations on mechanical influence of molecular actions to chromatin organization and dynamics
Rakesh Das[2], Takahiro Sakaue[3], Gv Shivashankar[4,5], Jacques Prost[2,6], **Tetsuya Hiraiwa[1,2]** ([1]*Institute of Physics, Academia Sinica*, [2]*Mechanobiology Institute, National University of Singapore*, [3]*Department of Physics and Mathematics, Aoyama Gakuin University*, [4]*ETH Zurich, Switzerland*, [5]*Paul Scherrer Institute*, [6]*Laboratoire Physico Chimie Curie, Institut Curie*)

2SBP-5　Meiotic pairing via rapid homolog juxtaposition in budding yeast
Tadasu Nozaki, Beth Weiner, Nancy Kleckner (*Harvard University, MCB*)

2SBP-6　転写バーストサイクル過程で変化する高次ゲノム構造
Higher-order genomic structures transformed during the transcription burst cycle
○落合 博（九大・生医研・遺伝子発現動態）
Hiroshi Ochiai (*Div. of Gene Exp. Dyna., MIB, Kyushu Univ.*)

2SBP-7　Chromatin dynamics and the role of RNA polymerase II
Lea Costes[1], Silvia Kocanova[1], Thomas Mangeat[1], Manoel Manghi[2], **Kerstin Bystricky[1]** ([1]*Molecular Cellular and Developmental biology unit, Center for Integrative Biology (CBI), University of Toulouse, CNRS, Toulouse, France*, [2]*Laboratoire de Physique Théorique (LPT), University of Toulouse, CNRS, Toulouse, France*)

おわりに
Closing Remarks

2SCP　シン・合成生物学：既存生命のみに依拠しないシステム創成に向けた化学者からの提案
Material-driven biomimetic systems for a new paradigm of synthetic biology

オーガナイザー：岸村 顕広（九州大学），金原 数（東京工業大学）
Organizers: Akihiro Kishimura (Kyushu Univ.), Kazushi Kinbara (Tokyo Tech.)

14:00〜16:30
C 会場（会議室 221（2 号館 2F））／Room C（Conference Room 221 (Bldg. 2, 2F)）

Synthetic biology has recently made remarkable progress and is expected to be a discipline that will innovate medicine, agriculture, and industries. From the viewpoint of material sciences, however, the current synthetic biology seems to target systems that can work only under limited conditions within a very limited material framework allowed on our planet. In this symposium, we aim to discuss the synthesis of living creatures and the creation of new systems beyond the framework of existing organisms on Earth. We invite up-and-coming material scientists as speakers to build a new paradigm of synthetic biology and bring a new perspective to biophysics. We are convinced that this symposium will help to enable the evolution of living creatures beyond the framework of conventional biology and for the creation of life as yet unseen.

はじめに
Opening Remarks

2SCP-1　合理的に設計された合成コアセルベートに基づくタンパク質取り込み活性を有する人工非膜オルガネラの開発
Development of artificial membraneless organelle with protein sequestration activity based on rationally designed synthetic coacervates
○岸村 顕広 [1,2,3]（[1] 九州大学大学院工学研究院応用化学部門, [2] 九州大学分子システム科学センター, [3] 九州大学未来化学創造センター）
Akihiro Kishimura[1,2,3] ([1]*Kyushu University, Department of Applied Chemistry, Faculty of Engineering*, [2]*Kyushu University, Center for Molercular Systems*, [3]*Kyushu University, Center for Future Chemistry*)

2SCP-2　化学反応制御の液液相分離：化学者視点から考案した合成低分子ペプチドの合理的設計と機能発現
Chemical design of synthetic short peptides toward reaction-controlled liquid-liquid phase separation
○窪田 亮（京大・院工）
Ryou Kubota (*Grad. Sch. Eng., Kyoto Univ.*)

2SCP-3　脂質ベシクルと金属化合物の融合による生体模倣システムの構築
Construction of biomimetic system by hybridization of lipid vesicles and metal compounds
○越山 友美（立命館大 生命科学）
Tomomi Koshiyama (*Coll. Life Sci., Ritsumeikan Univ.*)

2SCP-4　Phospholipid Bilayer Surrounded by Amphipathic DNA Double-decker Ring as Synthetic Membrane Model for Membrane Proteins Study
Seaim Lwin Aye[1], Thorsten Schmidt[2], Yusuke Sato[1] ([1]*Department of Intelligent and Control Systems, Graduate School of Computer Science and Systems Engineering, Kyushu Institute of Technology, Iizuka, Fukuoka, JAPAN 820-2502*, [2]*Department of Physics, Kent State University, Kent, OH 44242, USA*)

2SCP-5　無機ナノシートを利用した生体模倣システムの構築
Development of biomimetic systems using inorganic nanosheets
○佐野 航季（信州大・繊維学部）
Koki Sano (*Fac. of Textile Sci. and Tech., Shinshu Univ.*)

2SCP-6 Synthesized micro-materials for self-sustainable works: Morphologies of active-molecule assemblies alter the apparent reaction kinetics
○景山 義之（北大・院理）
Yoshiyuki Kageyama (*Fac. Sci., Hokkaido Univ.*)

おわりに
Closing Remarks

2SDP 分子イメージングが切り拓く細胞外微粒子研究
Extracellular Fine Particle Research facilitated by State-of-the-Art Microscopy Techniques

共催 JST/CREST「細胞外微粒子」

オーガナイザー：鈴木 健一（岐阜大学/国立がん研究センター研究所），末次 志郎（奈良先端科学技術大学院大学）
Organizers: Kenichi Suzuki (Gifu Univ./NCC), Shiro Suetsugu (NIAST)

14:00〜16:30
D 会場（会議室 222+223（2 号館 2F））／Room D（Conference Room 222+223 (Bldg. 2, 2F)）

Extracellular fine particles including exogenous fine particle such as PM2.5 and endogenous fine particles such as extracellular vesicles (EVs) including exosomes, have generated significant attention due to their ability to induce crucial biological responses. For instance, EVs serve as mediators of intercellular communication. However, due to the heterogeneity of extracellular fine particles and the difficulty of separation, the molecular mechanisms underlying biological responses to these particles and their dynamics have been very controversial. To elucidate these mechanisms, it is imperative to characterize individual extracellular fine particles in living cells by microscopy. This symposium aims to focus on studies that uncover the behavior of extracellular fine particles by cutting-edge imaging techniques such as single-molecule/super-resolution imaging, lattice-light sheet microscopy, and scanning electron-assisted dielectric microscopy.

2SDP-1 The BAR domain assembly and the extracellular vesicle formation from cellular protrusions
Shiro Suetsugu (*Grad Sch Sci Tech, NAIST*)

2SDP-2 小胞による細胞間コミュニケーションの新しい様式と役割ー隣接細胞間直接輸送と細胞形質同調ー
Novel mode and roles of vesicle-mediated cellular communication - direct intercellular transfer and phenotypic synchronization -
○山下 潤（東大・院医学）
Jun K. Yamashita (*Grad. Sch. Med., Univ. Tokyo*)

2SDP-3 走査電子誘電率顕微鏡による細胞内のメラニン色素小胞の直接観察と画像解析
Direct observation of intracellular melanosomes using scanning electron dielectric microscopy and the image analysis
○小椋 俊彦, 岡田 知子（産総研・健康医工学研究部門）
Toshihiko Ogura, Tomoko Okada (*Health and Medical Research Institute, Nat. Inst. Adv. Ind. Sci. Tech. (AIST)*)

2SDP-4　細胞外小胞が誘起する接着シグナルが、標的細胞によるそれ自身の取り込みを促進する
Small extracellular vesicles trigger adhesion signaling that facilitates their uptake by the target cells
○廣澤 幸一朗 [1], 佐藤 雄介 [2], 山口 英利子 [1], 河村 奈穂子 [1], 安藤 弘宗 [1], 横田 康成 [3], 鈴木 健一 [1,4,5]（[1] 岐大・糖鎖生命コア研究所, [2] 東北大・院理・化学, [3] 岐大・工・電情, [4]CREST, JST, [5] 国立がん研究センター・研究所）
Koichiro M. Hirosawa[1], Yusuke Sato[2], Eriko Yamaguchi[1], Naoko Komura[1], Hiromune Ando[1], Yasunari Yokota[3], Kenichi G.N. Suzuki[1,4,5] ([1]*iGCORE, Gifu Univ.*, [2]*Dept. Chem. Tohoku Univ.*, [3]*Dept. Eng., Gifu Univ.*, [4]*CREST, JST*, [5]*Natl. Cancer Ctr. Res. Inst.*)

2SDP-5　進化した aifA を用いたエクソソームの不均一性の高精度解明
High-precision elucidation of exosome heterogeneity using advanced aifA
○許 岩 [1,2]（[1] 大阪公立大・院工, [2]JST・CREST）
Yan Xu[1,2] ([1]*Grad. Sch. Eng., Osaka Metropolitan Univ.*, [2]*JST, CREST*)

2SDP-6　両親媒性 α-helix ペプチドによる高曲率性膜認識を利用した細胞外小胞解析プローブの設計と応用
Amphipathic helical peptide-based fluorescent probes with membrane curvature-sensing properties for analysis of extracellular vesicles
○佐藤 雄介（東北大院理）
Yusuke Sato (*Graduate School of Science, Tohoku Univeristy*)

2SEP　構造・計算・分光研究から解明する光受容性タンパク質の非平衡状態ダイナミクス
Unraveling the non-equilibrated dynamics of photoreceptive proteins by structural, theoretical, and spectroscopic investigations

共催 新学術領域研究「高速分子動画」

オーガナイザー：山元 淳平（大阪大学），片山 哲郎（徳島大学）
Organizers: Junpei Yamamoto (Osaka Univ.), Tetsuro Katayama (Tokushima Univ.)

14:00〜16:30
E 会場（会議室 224（2 号館 2F））／Room E（Conference Room 224 (Bldg. 2, 2F)）

Time-resolved serial femtosecond crystallography (TR-SFX) using X-ray free electron laser can capture transient structures of proteins at work and thus is a powerful strategy to make Molecular Movies. However, complementary techniques are also required to interpret the obtained data and decipher the structural dynamics at an atomic resolution. In this symposium, we focus on the nonequilibrated dynamics of photoreceptive proteins revealed by various techniques, such as structural analyses, theoretical calculations, and time-resolved spectroscopy. We will discuss the latest outcomes and the future of time-resolved structural analyses including TR-SFX.

はじめに
Opening Remarks

2SEP-1　光合成タンパク質における励起エネルギー移動の計算機シミュレーション
Computational Simulations of Excitation Energy Transfers in Photosynthetic Proteins
○鬼頭 宏任 [1], 下岡 渉 [2], 伊藤 繁 [2], 木村 明洋 [2]（[1] 近畿大・理工・エネ物, [2] 名大院・理・物理）
Hirotaka Kitoh[1], Wataru Shimooka[2], Shigeru Itoh[2], Akihiro Kimura[2] ([1]*Dept. eMAT, Fac. Sci. Eng., Kindai Univ.*, [2]*Dept. Phys. Grad. Sch. Sci., Nagoya Univ.*)

2SEP-2 **光合成アンテナ蛋白質フィコシアニンにおける光エネルギー移動の構造研究**
Structural Study of Antenna Protein Phycocyanin in Photosynthetic Light Energy Transfer
○梅名 泰史 [1], 片山 哲郎 [2,3,4], 高山 友理子 [5], 中根 崇智 [6]（[1] 名古屋大・シンクロ, [2] 徳島大・ポスト LED フォトニクス研, [3] 徳島大・院創成科学理工, [4]JST 創発, [5] 自治医科大・生物物理, [6] 大阪大・蛋白研）
Yasufumi Umena[1], Tetsuro Katayama[2,3,4], Yuriko Takayama[5], Takanori Nakane[6] ([1]*NUSR, Nagoya Univ.*, [2]*Inst. of post-LED Photonics, Univ. Tokushima*, [3]*Grad. Sch. Tech. Innov., Univ. Tokushima*, [4]*FOREST/JST*, [5]*Div. of Biophysics., Aichi Medical Univ.*, [6]*Inst. for Protein Research, Osaka Univ.*)

2SEP-3 **フェムト秒顕微過渡吸収分光法を用いた単一結晶中フィコシアニン三量体間のエネルギー移動反応の観測**
Observation of energy transfer dynamics between phycocyanin trimmers in a single crystal by femtosecond transient absorption microscopy
○片山 哲郎 [1,2,4], 上田 柊斗 [2], 古部 昭広 [1,2], 梅名 泰史 [3]（[1] 徳島大・ポスト LED フォトニクス研究所, [2] 徳島大・大学院創成科学研究科理工学専攻, [3] 名古屋大・シンクロトロン光研究センター, [4]JST 創発）
Tetsuro Katayama[1,2,4], Shuto Ueda[2], Akihiro Furube[1,2], Yasufumi Umena[3] ([1]*Institute of post-LED Photonics, Univ. Tokushima*, [2]*Grad. Sch. Sci. Tech. Innov., Univ. Tokushima*, [3]*Synchrotron Radiation Research Center, Univ. Nagoya*, [4]*FOREST/JST*)

2SEP-4 **非断熱 QM/MM 分子動力学計算法の開発と光駆動タンパク質への応用**
Development of non-adiabatic QM/MM molecular dynamics method and applications to light-driven proteins
○八木 清（理化学研究所開拓研究本部）
Kiyoshi Yagi (*RIKEN CPR*)

2SEP-5 **レチナール発色団のねじれとプロトン化が制御するチャネルロドプシン C1C2 のゲーティング機構**
Twisting and Protonation of Retinal Chromophore Regulate Channel Gating of Channelrhodopsin C1C2
○柴田 桂成 [1], 小田 和正 [2], 西澤 知宏 [2], 挾間 優治 [1], 小野 稜平 [1,3], 寶本 俊輝 [1], Reza Bagherzadeh[1], 八尾 寛 [1], 濡木 理 [2], 井上 圭一 [1], 秋山 英文 [1]（[1] 東大物性研, [2] 東大・院理, [3] 群大・院理工）
Keisei Shibata[1], Kazumasa Oda[2], Tomohiro Nishizawa[2], Yuji Hazama[1], Ryohei Ono[1,3], Shunki Takaramoto[1], Bagherzadeh Reza[1], Hiromu Yawo[1], Osamu Nureki[2], Keiichi Inoue[1], Hidefumi Akiyama[1] ([1]*ISSP., Univ. Tokyo*, [2]*Grad. Sch. Sci., Univ. Tokyo*, [3]*Grad. Sch. Sci. & Tech., Gunma Univ.*)

2SEP-6 The *ic*OS Lab at the ESRF: preparing and complementing time-resolved crystallography experiments with *in crystallo* optical spectroscopy
Antoine Royant[1,2] ([1]*Institut de Biologie Structurale, Grenoble, France*, [2]*European Synchrotron Radiation Facility, Grenoble, France*)

2SEP-7 Time-resolved serial femtosecond crystallography on animal-like cryptochrome from *Chlamydomonas reinhardtii*
Yuhei Hosokawa[1,2,3], Mai Nakamura[2], Junpei Yamamoto[2], Manuel Maestre-Reyna[1,3] ([1]*IBC, Academia Sinica*, [2]*Grad. Sch. Eng. Sci., Osaka Univ.*, [3]*Dept. Chem., National Taiwan Univ.*)

2SFP　多様なリズム現象から探る概日時計研究の行方
Future Direction of Circadian Clock Research from the Viewpoint of Diverse Rhythmic Phenomena

オーガナイザー：秋山 修志（分子科学研究所），寺内 一姫（立命館大学）
Organizers: Shuji Akiyama (IMS), Kazuki Terauchi (Ritsumeikan Univ.)

14:00〜16:30
F 会場（会議室 231（2 号館 3F））／Room F（Conference Room 231 (Bldg. 2, 3F)）

Circadian clocks have three common characteristics: free-running oscillations, temperature compensation, and entrainment. While molecular bases for these three properties are being elucidated, the nature of the core oscillator and its diversity remain largely unexplored, and are being actively studied from approaches such as physiology, biophysics, and structural biology. In addition, in response to the growing interest in a style of "create to understand", some research is also being conducted from the perspective of how well sophisticated properties such as circadian clocks can be granted to soft matter. In this symposium, considering complex diversity and commonality found in cyanobacteria, duckweed, and artificial gels, we would like to discuss future approaches to elucidate the circadian clock systems.

はじめに
Opening Remarks

2SFP-1　KaiCI の ATPase 活性が概日振動の最も基礎的な原動力である
ATPase activity of KaiC-CI is the most fundamental process of circadian oscillator of cyanobacteria
○近藤 孝男 [1], 伊藤 – 三輪 久美子 [1], 寺内 一姫 [2]（[1] 名古屋大学, [2] 立命館大学）
Takao Kondo[1], Kumiko Ito-Miwa[1], Kazuki Terauchi[2] ([1]*Nagoya University*, [2]*Ristumeikan University*)

2SFP-2　Activation mechanism of a clock protein KaiC by KaiA
Yasuhiro Onoue, Tomoki Noguchi, Genta Mizuno, Kazuki Terauchi (*Coll. Life Sci., Ritsumeikan Univ.*)

2SFP-3　ウキクサ植物でみられる細胞非自律的な概日リズム
A non-cell-autonomous circadian rhythm in duckweed plant
○渡邊 絵美理 [1], 村中 智明 [2], 中村 駿志 [3], 磯田 珠奈子 [4], 堀川 湧 [5], 相磯 豪志 [5], 伊藤 照悟 [5], 小山 時隆 [5]（[1] 東京大・院新領域, [2] 名古屋大・院生命農学, [3] 東京大・院理, [4] 県立広島大・生物資源科学, [5] 京都大・院理）
Emiri Watanabe[1], Tomoaki Muranaka[2], Shunji Nakamura[3], Minako Isoda[4], Yu Horikawa[5], Tsuyoshi Aiso[5], Shogo Ito[5], Tokitaka Oyama[5] ([1]*Grad. Sch. of Front. Sci., Univ. of Tokyo*, [2]*Grad. Sch. Bioagric. Sci., Nagoya Univ.*, [3]*Grad. Sch. Sci., Univ. of Tokyo*, [4]*Dept. of Bio. Res. Sci., Pref. Univ. of Hiroshima*, [5]*Grad. Sch. Sci., Kyoto Univ.*)

2SFP-4　化学振動ゲルの温度補償機構
Temperature-compensation mechanism of chemical oscillation in gels
○山田 雄平 [1], 伊藤 浩史 [2], 前田 真吾 [1]（[1] 東京工業大学, [2] 九州大学）
Yuhei Yamada[1], Hiroshi Ito[2], Shingo Maeda[1] ([1]*Tokyo Institute of Technology*, [2]*Kyushu University*)

2SFP-5　KaiC の ATPase 制御がシアノバクテリア時計タンパク質の会合と解離を引き起こす
ATPase Regulation in KaiC Triggers Assembly and Disassembly of Clock Proteins in Cyanobacteria
○古池 美彦 [1,2], 秋山 修志 [1,2]（[1] 分子科学研究所, [2] 総合研究大学院大学）
Yoshihiko Furuike[1,2], Shuji Akiyama[1,2] ([1]*Institute for Molecular Science*, [2]*SOKENDAI*)

おわりに
Closing Remarks

2SGP　GPCR ダイナミクスの全体像
Holistic concepts in GPCR dynamics

オーガナイザー：片山 耕大（名古屋工業大学），寿野 良二（関西医科大学）
Organizers: Kota Katayama (Nagoya Inst. of Tech.), Ryoji Suno (Kansai Medical Univ.)

14:00〜16:30
G 会場（会議室 232+233（2 号館 3F））／Room G（Conference Room 232+233 (Bldg. 2, 3F)）

Tremendous advances in the structural biology and pharmacology of GPCRs, coupled with rapid advances in computational approaches, have expanded our understanding of both structural and functional aspects of GPCR dynamics and GPCR-ligand or partner protein interactions, providing guidance for new structure-based drug design. The goal of this symposium is to expose scientists to recent discoveries and cross-disciplinary approaches utilized to study GPCRs and provide opportunities for establishing communications that bridge complementary interests in the field of GPCRs. This session will feature speakers who have made exciting discoveries about the molecular mechanisms of GPCRs and partner proteins involved in signal transduction by utilizing spectroscopic, structural biology, single molecule observations, and computational chemistry approaches.

2SGP-1　Structural insights into human kappa opioid receptor signaling by biased ligand
Chiyo Suno-Ikeda[1], **Ryoji Suno[1]**, Ryo Nishikawa[2], Riko Suzuki[3], Seiya Iwata[2], Tomoyo Takai[1], Takaya Ogura[3], Mika Hirose[4], Akitoshi Inoue[1], Eri Asai[1], Ryoji Kise[3], Yukihiko Sugita[5], Tsuyoshi Saito[6], Kota Katayama[2], Asuka Inoue[3], Takayuki Kato[4], Hiroshi Nagase[6], Hideki Kandori[2], Takuya Kobayashi[1]
([1]*Dept. Med., Kansai Med. Univ.*, [2]*Grad. Sch. Eng., Nagoya Inst. Tech.*, [3]*Grad. Sch. Pharm. Sci., Tohoku Univ.*, [4]*IPR, Osaka Univ.*, [5]*LiMe, Kyoto Univ.*, [6]*IIIS, Tsukuba Univ.*)

2SGP-2　NOAH: NOvel AI-assisted High-throughput construct screening for structural analysis
Hideaki Kato (*Univ. Tokyo*)

2SGP-3　G タンパク質と β アレスチンが協奏する GPCR 下流の ERK シグナル伝達
Co-regulation of GPCR-mediated ERK signaling by G protein and β-arrestin
○柳川 正隆 [1,2]（[1] 東北大・院薬, [2] 理研・開拓）
Masataka Yanagawa[1,2] ([1]*Grad. Sch. Pharm., Tohoku Univ.*, [2]*Riken, CPR*)

2SGP-4　分子動力学シミュレーションを用いた GPCRs の安定性とダイナミクスの解析
Investigating Stability and Dynamics of Class A GPCRs using Molecular Dynamics Simulations
○光武 亜代理（明大・物理）
Ayori Mitsutake (*Dept. Physics, Meiji Univ.*)

2SGP-5　Vibrational spectroscopy analyses of ligand recognition and activation mechanisms in G protein-coupled receptors
Kota Katayama[1,2] ([1]*Grad. Sch. Eng., Nagoya Inst. Tech.*, [2]*OptoBioTechnology Research Center., Nagoya Inst. Tech.*)

2SHP　クライオ電顕を用いたユニークな生体分子構造決定の試み
Challenging structural determination of unique biomolecules using cryo-electron microscopy

オーガナイザー：山本 直樹（自治医科大学），バートンースミス レイモンド（生理学研究所）
Organizers: Naoki Yamamoto (Jichi Medical Univ.), Raymond N. Burton-Smith (NIPS)

14:00〜16:30
H 会場（会議室 234（2 号館 3F））／Room H（Conference Room 234 (Bldg. 2, 3F)）

Cryo-electron microscopy is a powerful tool to determine structures of biomolecules. Especially, it is suitable for those which are difficult to be crystallized such as flexible virus capsids, fibrils, or membrane proteins. In this symposium, young scientists challenging to solve structures of such complicated biomolecules will present their recent results. We will discuss how to solve problems that we encounter in the sample preparation and single-particle analysis.

はじめに
Opening Remarks

2SHP-1　電子顕微鏡を用いたアミロイド線維構造の研究
Electron microscopy of amyloid fibril structures
○山本 直樹（自治医大・医）
Naoki Yamamoto (*Sch. Med., Jichi Med. Univ.*)

2SHP-2　Structural analysis of artificially designed peptide nanofibers by cryo-electron microscopy
Minami Kurokawa[1], Akihiro Kawamoto[2], Mika Hirose[2], Atsuo Tamura[1] ([1]*Grad. Sch. Sci., Univ. Kobe*, [2]*IPR, Univ. Osaka*)

2SHP-3　Cryo-EM structures of human zinc transporter ZnT7 reveal the mechanism of Zn^{2+} uptake into the Golgi apparatus
Ba Han Bui[1,2], Satoshi Watanabe[1,2,3], Kenji Inaba[1,2,3,4,5] ([1]*IMRAM, Tohoku Univ.*, [2]*Dept. Mol. Chem. Life Sci., Grad. Sch. Life Sci., Tohoku Univ.*, [3]*Dept. Chem., Grad. Sch. Life Sci., Tohoku Univ.*, [4]*Med. Inst. Bioregulation, Kyushu Univ.*, [5]*CREST, AMED*)

2SHP-4　シチジン修飾を持つイソロイシン tRNA による遺伝暗号解読の構造基盤
Structural insights into the decoding capability of isoleucine tRNAs with cytidine modification
○秋山 奈穂 [1], 石黒 健介 [1,2], 横山 武司 [2,3], 宮内 健常 [1], 長尾 翌手可 [1], 白水 美香子 [2], 鈴木 勉 [1] ([1] 東大・院工, [2] 理研 BDR・横浜, [3] 東北大・院生命科学）
Naho Akiyama[1], Kensuke Ishiguro[1,2], Takeshi Yokoyama[2,3], Kenjyo Miyauchi[1], Asuteka Nagao[1], Mikako Shirouzu[2], Tsutomu Suzuki[1] ([1]*Grad. Sch. Eng., UTokyo*, [2]*Yokohama Inst., RIKEN BDR*, [3]*Grad. Sch. Life Sci., Tohoku Univ.*)

2SHP-5　ヘム含有型酸素センサータンパク質 HemAT における構造解析の試み
Challenges in the structural analysis of the heme-based oxygen sensor protein HemAT
○東田 怜 [1], 村木 則文 [2], 横山 武司 [3], 奥村 英夫 [4], 馬場 清喜 [4], 河野 能顕 [5], 青野 重利 [1] ([1] 自然科学生命創成, [2] 慶應大 理工, [3] 東北大 生命, [4]JASRI, [5] 理研 RSC）
Rei Tohda[1], Norifumi Muraki[2], Takeshi Yokoyama[3], Hideo Okumura[4], Seiki Baba[4], Yoshiaki Kawano[5], Shigetoshi Aono[1] ([1]*ExCELLS, NINS*, [2]*Dep. of Chem., Keio Univ.*, [3]*Grad. Sch. of Life Sciences., Tohoku Univ.*, [4]*JASRI*, [5]*RIKEN SPring-8 Center*)

2SHP-6　The challenge of studying giant viruses by cryo-electron microscopy
Raymond Burton-Smith[1,2] ([1]*Exploratory Center for Life and Living Systems (ExCELLS), National Institute of Natural Sciences, Okazaki*, [2]*National Institute of Physiological Sciences, National Institute of Natural Sciences, Okazaki*)

おわりに
Closing Remarks

2SIP　液液相分離の生物物理学的研究の最前線
The forefront of biophysical research of liquid-liquid phase separation

オーガナイザー：亀田 倫史（産業技術総合研究所），鎌形 清人（東北大学）
Organizers: Tomoshi Kameda (AIST), Kiyoto Kamagata (Tohoku Univ.)

14:00〜16:30
I 会場（国際会議室（3 号館 3F））／Room I（International Conference Room (Bldg. 3, 3F)）

In this symposium, we focus on five presentations for introducing the current progress of liquid-liquid phase separation of biomolecules or biomolecular systems. The presenters cover various approaches such as single-molecule microscopy, rheology, and molecular dynamics simulations. In addition, wide topics are discussed including enzymatic reactions in condensates, phase separating peptide design, and dynamics of molecules in condensates.

はじめに
Opening Remarks

2SIP-1　DNA 液滴での DNA 結合タンパク質の単分子解析および相分離ペプチドの合理的設計
Single-molecule characterization of DNA-binding proteins in DNA droplets and rational design of artificial phase separating peptides
○鎌形 清人（東北大・多元研）
Kiyoto Kamagata (*IMRAM, Tohoku Univ.*)

2SIP-2　Regulation of Biomolecular Condensation Studied with Large-Scale Coarse-Grained Molecular Dynamics Simulations in GENESIS
Cheng Tan[1], Ai Niitsu[2], Jaewoon Jung[1,2], Yuji Sugita[1,2,3] ([1]*Computational Biophysics Research Team, RIKEN Center for Computational Science*, [2]*Theoretical Molecular Science Laboratory, RIKEN Cluster for Pioneering Research*, [3]*Laboratory for Biomolecular Function Simulation, RIKEN Center for Biosystems Dynamics Research*)

2SIP-3　Membraneless active droplets mimic features of living systems
Bevilacqua Alessandro[1], Dindo Mirco[2], Soligo Giovanni[1], Rosti Marco Edoardo[1], Laurino Paola[1] ([1]*Okinawa Institute of Science and Technology*, [2]*University of Perugia*)

2SIP-4　解糖系酵素の液-液相分離
Liquid-liquid phase separation of glycolytic enzymes
○三浦 夏子（大阪公立大・院農）
Natsuko Miura (*Grad. Sch. Agric., Osaka Metropolitan Univ.*)

2SIP-5　液ー液相分離で形成されたオートファジー関連凝集体のマイクロレオロジー
Microrheology of aging autophagy-related aggregates formed by liquid-liquid phase separation
Daisuke Mizuno[1], Kairi Tomita[1], Makoto Fujiwara[1], Haruka Chino[2], Norr Roland[2], Noboru Mizushima[2] ([1]*Kyushu University*, [2]*Tokyo University*)

おわりに
Closing Remarks

2SJP　高解像度な細胞・微粒子解析テクノロジーの最前線
The forefront of high-resolution cell and bioparticle analysis technology
共催 JST/CREST「細胞外微粒子」

オーガナイザー：太田 禎生（東京大学），渡邊 力也（理化学研究所）
Organizers: Sadao Ota (The Univ. of Tokyo), Rikiya Watanabe (RIKEN)

14:00〜16:30
J 会場（会議室 141+142（1 号館 4F））／Room J（Conference Room 141+142 (Bldg. 1, 4F)）

Science and technology feed each other, mutually driving progress in both fields. This symposium assembles leading developers and adopters of cutting-edge technology focused on cell-based, extracellular vesicle (EV)-based, and molecular-based phenotyping. By fostering insightful conversations and engaging presentations, we anticipate the emergence of synergistic and inventive connections among the various strata of biological systems. These include molecules (nucleic acids, peptides, proteins), biological particles (organelles, viruses, EVs), and cells (single cells, organoids).

はじめに
Opening Remarks

2SJP-1　細胞外微粒子解析に向けた CRISPR-Cas によるデジタル核酸検出
Digital nucleic-acid detection with CRISPR-Cas for analysis of extracellular vesicles
○篠田 肇, 渡邉 力也（理研・開拓研究本部）
Hajime Shinoda, Rikiya Watanabe (*CPR, RIKEN*)

2SJP-2　Single-granule RNA-Seq: a comprehensive method for RNA heterogeneity in cellular granules
Yuichi Shichino[1], Mari Mito[1], Shintaro Iwasaki[1,2] ([1]*RIKEN CPR*, [2]*Grad. Sch. Front. Sci., Univ. Tokyo*)

2SJP-3　ヒトの発生過程を in vitro で再現するための幹細胞の分化操作
Manipulation of stem cell differentiation to recapitulate human developmental processes in vitro
○永樂 元次（京都大学・医生物学研究所）
Mototsugu Eiraku (*Institute for Life and Medical Sciences, Kyoto University*)

2SJP-4　人知を超える学習サイトメトリー技術群
Learning Cytometry Technologies
○太田 禎生 [1,2]（[1] 東大・先端研, [2] シンクサイト株式会社）
Sadao Ota[1,2] ([1]*RCAST, Univ Tokyo*, [2]*ThinkCyte Inc*)

2SJP-5　疾患関連エクソソームによる臓器特異的分布と病態寄与機構
Organotropic localization of disease-associated exosomes and its role in etiology
○星野 歩子（東大　先端研）
Ayuko Hoshino (*RCAST, Univ. Tokyo*)

おわりに
Closing Remarks

2SKP　超越分子シンポジウム：分子のシステムを社会に実装する
The symposium of bottom-up creation of cell-free molecular systems: basic research toward social implementation

共催 学術変革領域研究（A）「超越分子システム」

オーガナイザー：川野 竜司（東京農工大学），川村 出（横浜国立大学）
Organizers: Ryuji Kawano (Tokyo Univ. of Agric. and Tech.), Izuru Kawamura (Yokohama Natl. Univ.)

14:00〜16:30
K 会場（会議室 131+132（1 号館 3F））／Room K（Conference Room 131+132 (Bldg. 1, 3F)）

Research on the bottom-up creation of cells has progressed substantially, resulting in reconstituted molecular systems that mimic various cellular functions and properties. However, the bottom-up construction of molecular systems aimed at goals of social implementation has been rarely developed. In this symposium, current research topics including applied and social development based on the basic research of unique molecular systems will be presented. We especially focus on advanced technologies such as cell-free protein synthesis, adhesive nanofiber proteins, and high-throughput single cell-screening.

はじめに
Opening Remarks

2SKP-1　Optimizing the protein synthesis activity of a reconstituted in vitro transcription-translation system
Tomoaki Matsuura (*ELSI, Tokyo Tech*)

2SKP-2　無細胞タンパク質合成系の社会実装
Social implementation of a cell-free protein synthesis system
○清水 義宏（理化学研究所生命機能科学研究センター）
Yoshihiro Shimizu (*RIKEN Center for Biosystems Dynamics Research*)

2SKP-3　希少細胞を対象とした単一細胞遺伝子解析のプラットフォーム開発と応用展開
Development of a platform for single-cell genetic analysis of “rare cells” and their applications
○吉野 知子（東京農工大学）
Tomoko Yoshino (*Tokyo University of Agriculture and Technology*)

2SKP-4　次世代バイオものづくりのための未培養微生物ゲノムデータベース
Uncultured microbial genome database for next-generation biomanufacturing
○細川 正人 [1,2]（[1] 早大院・先進理工, [2]bitBiome（株））
Masahito Hosokawa[1,2] ([1]*Grad. Sch. Adv. Sci. Eng., Waseda Univ.*, [2]*bitBiome*)

2SKP-5　社会実装のための生物物理学分野の研究戦略：一起業家的科学者からの洞察
Research strategies in biophysics for social implementation: Insights from an entrepreneurial scientist
○堀 克敏（名大・院工学）
Katsutoshi Hori (*Grad. Sch. Eng. Nagoya Univ.*)

おわりに
Closing Remarks

2SLP　細胞システムの複雑なメカニクス
Complex mechanics of the cellular system

オーガナイザー：出口 真次（大阪大学），平田 宏聡（金沢工業大学）
Organizers: Shinji Deguchi (Osaka Univ.), Hiroaki Hirata (Kanazawa Inst. of Tech.)

14:00〜16:30
L 会場（会議室 133+134（1 号館 3F））／Room L（Conference Room 133+134 (Bldg. 1, 3F)）

Cells are the unit of living systems, regulating diverse biological processes. It has now become clear that mechanical factors such as the stiffness of intracellular and extracellular components allow cellular systems to function properly, while the whole picture of the mechanisms is yet poorly understood. In this symposium, we focus on the roles of mechanical factors in mediating cellular and subcellular processes and discuss how “mechanics” in such highly complex systems could be probed with techniques/technologies in physics and engineering. Specifically, recent studies from both experimental and theoretical approaches will be presented regarding the embryonic and fetal development and cellular biophysical homeostasis.

2SLP-1　原子間力顕微鏡による発生組織メカニクス
Tissue and embryo mechanics probed by atomic force microscopy
○岡嶋 孝治（北海道大学大学院情報科学研究院）
Takaharu Okajima (*Fac. Inform. Sci. Tech., Hokkaido University*)

2SLP-2　脳の弾性率変動によって駆動される神経分化メカニズムの解明
A systematic strategy to understand the role of microenvironmental stiffness in neurogenesis
○岩下 美里, 小曽戸 陽一（韓国脳研究院）
Misato Iwashita, Yoichi Kosodo (*Korea Brain Research Institute*)

2SLP-3　Nuclear mechanics coordinating biological and mechanical functions in mesenchymal stem cell differentiation
Hiromi Miyoshi (*Mech. Sys. Eng., Tokyo Metro. Univ.*)

2SLP-4　気管軟骨の“パターン”と“形”を生み出す謎を解く
Solving the Mystery of Tracheal Cartilage "Patterns" and "Shapes"
○古川 可奈（阪大・INSD）
Kana Furukawa (*INSD, Osaka Univ.*)

2SLP-5　α-アクチニンによって調節されるストレスファイバーの物性はミオシン由来の力の伝達効率を調節する
Alpha-actinin-mediated physical properties of stress fibers regulate transmission of myosin-generated force
○勝田 紘基 [1,2], 奥田 覚 [3], 長山 和亮 [4], 町山 裕亮 [5], 加藤 昌志 [2], 曽我部 正博 [2,7], 宮田 卓樹 [2], 木戸秋 悟 [6], 平田 宏聡 [2,8]（[1] 岡山大・院・医歯薬, [2] 名大・院医, [3] 金沢大・ナノライフ生命, [4] 茨城大・理工, [5] 東京医大・免疫, [6] 九大・先導物質化学研究所, [7] 金沢工大・産学連携室, [8] 金沢工大・バイオ・化学）
Hiroki Katsuta[1,2], Satoru Okuda[3], Kazuaki Nagayama[4], Hiroaki Machiyama[5], Masashi Kato[2], Masahiro Sokabe[2,7], Takaki Miyata[2], Satoru Kidoaki[6], Hiroaki Hirata[2,8] ([1]*Grad. Sch. Med., Okayama Univ.*, [2]*Grad. Sch. Med., Nagoya Univ.*, [3]*Nano LSL, Kanazawa Univ.*, [4]*Dept. of Biomech. and Eng., Ibaraki Univ.*, [5]*Dept. of Immunol., Tokyo Medical Univ.*, [6]*IMCE, Kyushu Univ.*, [7]*KIT*, [8]*College of Biosci. and Chem., KIT*)

2SLP-6　The Q factor of single cells as a biophysical parameter to decipher cell state
Ilaria Incaviglia, Giulia Ammirati, Sophie Herzog, Daniel J. Müller (*ETH Zürich*)

2SLP-7　細胞の力学的なホメオスタシスと適応のメカニズム
Analyzing cellular mechanical homeostasis and adaptation
○出口 真次（阪大・基礎工）
Shinji Deguchi (*Div. Bioeng., Osaka Univ.*)

2SMP　微小環境で行動する単細胞生物の生存戦略
The survival strategies of unicellular organisms on a microscale
共催 学術変革領域研究（A）「ジオラマ行動力学」

オーガナイザー：鹿毛 あずさ（学習院大学），野村 真未（山形大学），柴 小菊（筑波大学）
Organizers: Azusa Kage (Gakushuin Univ.), Mami Nomura (Yamagata Univ.), Kogiku Shiba (Univ. of Tsukuba)

14:00〜16:30
M 会場（会議室 431+432（4 号館 3F））／Room M（Conference Room 431+432 (Bldg. 4, 3F)）

Movement is one of the fundamental characteristics of life. Although biophysical studies on molecular- and organelle-level motility have elucidated the mechanisms of biological movement, much remains unknown about behavior and its significance at the cellular level. In this symposium, we invite researchers to challenge the behavioral analysis of unicellular organisms and the techniques for capturing cell movement on a microscale. Through the presentations on various subjects including ciliates, amoebae, microalgae, and marine particles, we would like to discuss the behavior and survival strategies of unicellular organisms which are unique to microenvironments, aiming to establish the field of biophysics of behavior.

はじめに
Opening Remarks

2SMP-1　Cooperative hydrodynamics accompany multicellular-like colonial organization in the unicellular ciliate *Stentor*
Shashank Shekhar[1], Hanliang Guo[2], Sean Colin[3], Wallace Marshall[4], Eva Kanso[5], Jack Costello[6]
([1]*Emory University, Atlanta, USA*, [2]*Ohio Wesleyan University, Delaware, USA*, [3]*Roger Williams University, Bristol, USA*, [4]*University of California San Francisco, San Francisco, USA*, [5]*University of Southern California, Los Angeles, USA*, [6]*Providence College, Providence, USA*)

2SMP-2　繊毛虫ソライロラッパムシの細胞外幾何形状に応じた固着場所の選択
Selecting of anchoring location by geometrical cues, in the ciliate, *Stentor coeruleus*
○越後谷 駿 [1], 佐藤 勝彦 [1,2], 中垣 俊之 [1,2], 西上 幸範 [1,2]（[1] 北海道大学大学院生命科学院, [2] 北海道大学電子科学研究所）
Syun Echigoya[1], Katsuhiko Sato[1,2], Toshiyuki Nakagaki[1,2], Yukinori Nishigami[1,2] ([1]*Graduate School of Life Science, Hokkaido University*, [2]*Research Institute for Electronic Science, Hokkaido University*)

2SMP-3　Integrative modeling of *Paramecium*, a “swimming neuron”
Romain Brette (*ISIR, Sorbonne Universite, Paris, France*)

2SMP-4　有殻アメーバの被殻構築における巧みな細胞行動
Skillful cell behavior in the construction of testate amoebae shells
○野村 真未（山形大学理学部）
Mami Nomura (*Fac. Sci., Yamagata Univ.*)

2SMP-5　イベントベースビジョンセンサー（EVS）を用いたプランクトンの室内及び自然環境でのミリ秒スケール観測
Millisecond-scale behaviours of plankton quantified in situ and in vitro using the Event-based Vision Sensor (EVS)
○高塚 進[1,2], 宮本 教生[2]（[1] ソニーグループ株式会社, [2] 国立研究開発法人海洋研究開発機構）
Susumu Takatsuka[1,2], Norio Miyamoto[2] ([1]*Sony Group Corporation*, [2]*Japan Agency for Marine-Earth Science Technology*)

2SMP-6　シアノバクテリア鉛直移動における予測不能性
Fundamental unpredictability in the vertical migration of cyanobacteria
○吉山 浩平（滋賀県立大学環境科学部）
Kohei Yoshiyama (*Grad. Sch. Environ. Sci., Univ. Shiga Pref.*)

3 日目（11 月 16 日（木））／Day 3（Nov. 16 Thu.）

3SAA　構造生物学的アプローチに基づく液液相分離（LLPS）の機能解明
Functional elucidation of liquid-liquid phase separation (LLPS) based on structural biology approach

オーガナイザー：西田 紀貴（千葉大学），池谷 鉄兵（東京都立大学）
Organizers: Noritaka Nishida (Chiba Univ.), Teppei Ikeya (Tokyo Metro. Univ.)

09:00〜11:30
A 会場（展示室 211（2 号館 1F））／Room A（Exhibition Room 211 (Bldg. 2, 1F)）

Liquid-liquid phase separation (LLPS) is driven by the dynamic assembly of diverse protein and RNA molecules in the cells. In order to understand how such droplets, which are seemingly disordered structures, regulate various physiological functions, it is necessary to quantitatively measure the behavior of LLPS at the atomic and molecular levels. In this symposium, we would like to introduce recent studies of researchers who are aiming to elucidate the principles of LLPS formation and the regulation of intracellular functions by structural biology approaches such as NMR and computational science, as well as chemical biology.

3SAA-1　溶液 NMR による GRB2 と SOS1 の多価相互作用と液液相分離形成機構の解析
Analysis of the mechanism underlying multivalent interactions between GRB2 and SOS1 and their LLPS using solution NMR
○池谷 鉄兵[1], 大出 真央[2], Ren Weitong[2], 館野 圭太[1], 安藤 孝[1], 菅澤 はるか[1], 杉田 有治[2], 伊藤 隆[1]（[1] 東京都立大・院理, [2] 理研・開拓研究本部）
Teppei Ikeya[1], Mao Oide[2], Weitong Ren[2], Keita Tateno[1], Takashi Ando[1], Haruka Sugasawa[1], Yuji Sugita[2], Yutaka Ito[1] ([1]*Grad. Sch. Sci., Tokyo Metropolitan Univ.*, [2]*RIKEN CBR*)

3SAA-2　Mapping the per-residue surface electrostatic potential of CAPRIN1 along its phase-separation trajectory
Yuki Toyama[1,2,3], Atul Rangadurai[1,2,3,4], Julie Forman-Kay[2,4], Lewis Kay[1,2,3,4] ([1]*Department of Molecular Genetics, University of Toronto*, [2]*Department of Biochemistry, University of Toronto*, [3]*Department of Chemistry, University of Toronto*, [4]*Hospital for Sick Children, Program in Molecular Medicine*)

3SAA-3　がん抑制タンパク質 p53 が形成する凝集体の調製と分析
Preparation and analysis of aggregates formed by the tumor suppressor protein p53
○日比野 絵美[1], 土方 礼嗣[1], 天野 剛志[1,2], 廣明 秀一[1,2]（[1] 名大・院創薬, [2]BeCellBar）
Emi Hibino[1], Reiji Hijikata[1], Takeshi Tenno[1,2], Hidekazu Hiroaki[1,2] ([1]*Grad. Sch. Pharm. Sci, Nagoya Univ.*, [2]*BeCellBar*)

3SAA-4　分子シミュレーションによるタンパク質集合体の液液相分離研究
Liquid-liquid phase separation of protein assemblies studied by molecular simulations
○高田 彰二, 水谷 淳生, 山田 莉彩, 村田 隆（京都大学理学研究科）
Shoji Takada, Azuki Mizutani, Risa Yamada, Yutaka Murata (*Grad. Sch. Sci. Kyoto Univ*)

3SAA-5　細胞シグナル操作のためのデザイナータンパク質コンデンセート
Designer protein condensates for cell signal manipulation
○築地 真也（名工大・院工）
Shinya Tsukiji (*Grad. Sch. Eng., Nagoya Inst. Technol.*)

3SAA-6　細胞内環境下における LLPS 形成タンパク質 FUS の In-cell NMR 観測
In-cell NMR Observation of Liquid-Liquid Phase Separation of FUS
○西田 紀貴（千葉大・院薬）
Noritaka Nishida (*Grad. Sch. Pharm. Sci., Chiba Univ.*)

3SBA　天然変性タンパク質を含む創薬標的に対する生物物理学的アプローチ
Biophysical approaches against the drug target proteins involving intrinsically disordered regions

オーガナイザー：廣明 秀一（名古屋大学），白井 剛（長浜バイオ大学）
Organizers: Hidekazu Hiroaki (Nagoya Univ.),
Tsuyoshi Shirai (Nagahama Inst. of Bio-Science and Tech.)

09:00〜11:30
B 会場（展示室 212（2 号館 1F））／Room B（Exhibition Room 212 (Bldg. 2, 1F)）

Recent progress in proteomics of human diseases and host-pathogen interactions has revealed that potential therapeutic targets contain intrinsically disordered regions (IDRs). Proteins with large amounts of IDRs often lack a fixed or ordered three-dimensional structure, rendering them unsuitable for the modern structure-guided drug discovery methodology. This symposium aims to explore different biophysical approaches to drug discovery and development against IDRs. We will focus on methods that go beyond the classical lock-and-key model, including innovative approaches to understand the structural and dynamic properties of IDRs.

はじめに
Opening Remarks

3SBA-1　典型的でない創薬標的を対象とした溶液 NMR 技術の挑戦〜鍵と鍵穴モデルを超えて
NMR challenges against characterization of non-classical drug targets - beyond the lock-and-key model
○廣明 秀一 [1,2,3]（[1] 東海国立大学機構名古屋大学創薬科学研究科, [2] 合同会社 BeCellBar, [3] 東海国立大学機構　One Medicine 創薬シーズ開発・育成研究教育拠点）
Hidekazu Hiroaki[1,2,3] ([1]*Graduate School of Pharmaceutical Sciences, Nagoya University*, [2]*BeCellBar, LLC*, [3]*Center for One Medicine Innovative Translational Research (COMIT), Tokai National Higher Education and Research System*)

3SBA-2　NMR を用いた天然変性蛋白質の構造解析：アルファーシヌクレイン
NMR Analyses of an intrinsic disordered protein: Alpha-synuclein
○西村 千秋（帝京平成大学薬学部）
Chiaki Nishimura (*Faculty of Pharmaceutical Sciences, Teikyo Heisei University*)

3SBA-3　抗酸菌の天然変性ヒストン様タンパク質　ーその機能と休眠菌形成における役割ー
Mycobacterial intrinsically disordered histone-like protein, its function and role in mycobacterial dormancy
○西山 晃史[1], 清水 将裕[2,3], 古寺 哲幸[2], 尾関 百合子[1], 真柳 浩太[4], 山口 雄大[5], 松本 壮吉[1]（[1]新潟大院・医歯学総合・細菌学, [2]金沢大・ナノ生命科学研, [3]京都大・複合原子力科学研, [4]九州大・生体防御医学研, [5]大阪公大院・医・分子病態薬理学）
Akihito Nishiyama[1], Masahiro Shimizu[2,3], Noriyuki Kodera[2], Yuriko Ozeki[1], Kouta Mayanagi[4], Takehiro Yamaguchi[5], Sohkichi Matsumoto[1] ([1]*Dept. Bacteriol., Niigata Univ. Sch. Med.*, [2]*NanoLSI, Kanazawa Univ.*, [3]*Div. Quantum Beam Mater. Sci., Inst. Integr. Radiat. Nuc. Sci., Kyoto Univ*, [4]*Med. Inst. Bioregulation, Kyushu Univ.*, [5]*Dept. Pharmacol, Osaka Metro Univ. Med. Sch.*)

3SBA-4　天然変性タンパク質における“変性状態”の理解を目指した溶液散乱研究
Solution scattering towards details in flexibility of intrinsically disordered proteins
○清水 将裕[1], 守島 健[1], 奥田 綾[1], 井上 倫太郎[1], 西山 晃史[2], 松本 壮吉[2], 杉山 正明[1]（[1]京大・複合研, [2]新潟大院・医歯学総合・細菌学）
Masahiro Shimizu[1], Ken Morishima[1], Aya Okuda[1], Rintaro Inoue[1], Akihito Nishiyama[2], Sohkichi Matsumoto[2], Masaaki Sugiyama[1] ([1]*KURNS., Kyoto Univ.*, [2]*Dept. Bacteriol., Niigata Univ. Sch. Med.*)

3SBA-5　相分離における分子の動態を捉える
Visualizing molecular dynamics of phase separation
○森 英一朗（奈良医大・未来基礎医学）
Eiichiro Mori (*Dept. Future Basic Med., Nara Med. Univ.*)

おわりに
Closing Remarks

3SCA　自発と応答の情報物理学
Information physics of spontaneity and response

共催 新学術領域研究「生命の情報物理学」

オーガナイザー：青木 一洋（生命創成探究センター），松岡 里実（大阪大学）
Organizers: Kazuhiro Aoki (ExCELLS), Satomi Matsuoka (Osaka Univ.)

09:00〜11:30
C 会場（会議室 221（2 号館 2F））／Room C（Conference Room 221 (Bldg. 2, 2F)）

Physical understanding of information in living systems lies at the leading edge of biophysical studies. The advances in super resolution microscopy and accurate manipulation and measurement techniques have highlighted various unexpected behaviors of molecules and cells under collective motion, which reveals that the essence of the information underlies in the precisely quantified data acquired under the “living” state. In this symposium, we introduce the attempts to investigate the dynamics of living systems in the intrinsic state and in response to the extrinsic stimulus to explore the principles of spontaneous generation, transmission, and processing of biological information.

3SCA-1　バクテリア乱流の空間構造への応答：渦秩序の制御とキラリティー
How bacterial turbulence responds to spatial structures: controlling vortical order and chirality
○西口 大貴（東京大学・理・物理）
Daiki Nishiguchi (*Dept. Phys., Grad. Sch. Sci., Univ. Tokyo*)

3SCA-2 Force transmission via dynamic stretching of Talin as revealed by quantitative live-cell single-molecule imaging
Sawako Yamashiro[1,2], David M. Rutkowski[3], Ying Liu[1], Kelli Ann Lynch[4], Dimitrios Vavylonis[3], Naoki Watanabe[1,2] ([1]*Kyoto Univ. Grad. Sch. Biostudies, Kyoto*, [2]*Dept. Pharmacology, Kyoto Univ.Grad. Sch. Med., Kyoto*, [3]*Dept. Physics, Lehigh Univ., PA/USA*, [4]*Univ. of South Florida, FL/USA*)

3SCA-3 分子レベルでの情報伝達能力の評価から骨格筋ミオシン分子間の協同性を理解する
Understanding cooperativity between skeletal myosin molecules by evaluating information transmission capacity of myosin molecules
○茅 元司（東京大学・院物理）
Motoshi Kaya (*Grad. Sch. Sci., Univ. Tokyo*)

3SCA-4 Characterization of activity-dependent mechanics of the cell cytoplasm
Hiroyuki Ebata, Daisuke Mizuno (*Fac. Sci., Kyushu Univ.*)

3SCA-5 分裂酵母胞子の発芽過程における細胞質流動化の定量解析
Quantitative analysis of cytoplasmic fluidization during germination in fission yeast
○青木 一洋（ExCELLS/基生研）
Kazuhiro Aoki (*ExCELLS/NIBB, NINS*)

3SCA-6 バクテリア遊泳集団の揺らぎと応答
Fluctuation and response of bacterial collective swimming
○鳥谷部 祥一（東北大学・院応用物理）
Shoichi Toyabe (*Applid Physics, Tohoku Univ*)

3SEA 細胞のメゾ構造体の形成と機能の機構：先端イメジング法による解明
Mechanisms for the formation and functions of cellular meso-scale structures: unravelling by advanced imaging methods

オーガナイザー：下林 俊典（京都大学），楠見 明弘（沖縄科学技術大学院大学）
Organizers: Shunsuke Shimobayashi (Kyoto Univ.), Akihiro Kusumi (OIST)

09:00〜11:30
E 会場（会議室 224（2 号館 2F））／Room E（Conference Room 224 (Bldg. 2, 2F)）

To understand how cells work, biophysicists are now discovering the mechanisms by which mesoscale subcellular molecular complexes are formed and function. This approach, particularly that using advanced microscopic imaging methods, is turning out to be very fruitful. Meso-scale, often between 3 and 300 nm, is an interesting spatial scale where non-living nano-scale molecules are assembled to start exhibiting the clear features of micron-scale living cells. Furthermore, recent research advances on the liquid condensates are further activating meso-scale investigations. Therefore, this symposium will focus on this very hot topic of meso-scale structures/events, including liquid signaling platforms, myosin-motor-driven cargo-membrane sculpting, subsynaptic meso-domains, DNA breaks, and fundamental material properties of biomolecular condensates. We hope to make this symposium a place where, together with the audience, new fundamentally important ideas emerge toward the understanding of how subcellular meso-scale structures form and function.

はじめに
Opening Remarks

3SEA-1 **細胞膜上のナノ液体複合体が複数の受容体信号を統合する基盤となり、癌細胞の増殖を促進させる**
Nano-liquid platform on the plasma membrane that integrates receptor signals for cancer promotion
Taka-aki Tsunoyama[1], Christian Hoffmann[2], Daiki Sasaki[1], Bo Tang[1], Koichiro M Hirosawa[3], Yuri L Nemoto[4], Rinshi R Kasai[3], Takahiro K Fujiwara[5], Kenichi GN Suzuki[3,5], Hiroki Ishikawa[1], Dragomir Milovanovic[2], Akihiro Kusumi[1,5] ([1]*Okinawa Inst. Sci. Tech. Grad. Univ. (OIST)*, [2]*German Cent. Neurodegenerative Diseases (DZNE)*, [3]*Inst. Glyco-Core Res. (iGCORE), Gifu Univ.*, [4]*Biosignal Res. Cent., Kobe Univ.*, [5]*Inst.Integ.Cell-Mat. Sci. (WPI-iCeMS), Kyoto Univ.*)

3SEA-2 Membrane reshaping by myosin-lipid interactions
Claudia Veigel (*Department of Cellular Physiology, Ludwig-Maximilians-University Munich*)

3SEA-3 Emergence of highly ordered meso-structures of multivalent synaptic proteins in living cells
Hirokazu Sakamoto (*Grad. Sch. Med., The Univ. Tokyo*)

3SEA-4 Magnet tweezers studies of PARP binding at single and double strand DNA breaks
Justin Edward Molloy[1], Nicholas A.W. Bell[2] ([1]*Francis Crick Institute, London, UK*, [2]*University College London, Gower Street, London, UK*)

3SEA-5 **細胞内相分離メソ液滴の形成、物性、そして機能**
Elucidating the formation, material properties, and functions of biomolecular meso-scale condensates
○下林 俊典（京都大学 iPS 細胞研究所）
Shunsuke Shimobayashi (*CiRA, Kyoto University*)

おわりに
Closing Remarks

3SFA **水和による水運動の不均一性から考える生物分子機能**
Biomolecular functions based on heterogeneous hydration dynamics

オーガナイザー：今清水 正彦（産業技術総合研究所），菱田 真史（筑波大学）
Organizers: Masahiko Imashimizu (AIST), Masafumi Hishida (Univ. of Tsukuba)

09:00〜11:30
F 会場（会議室 231（2 号館 3F））／Room F（Conference Room 231 (Bldg. 2, 3F)）

How does a biomacromolecular complex like an enzyme work accurately and regulatory in water solvent system dominated by thermal fluctuations? The key to understand this question lies in the fact that, due to hydration, the thermal motions involved in biomolecular functions are temporally and spatially heterogeneous. For example, the collective intermolecular dynamics of protein and water molecules, which are overlapped in the sub-THz frequency region, may be relevant for expressing protein functions. In this symposium, we will attempt to discuss new directions regarding the unexplained phenomena in biomolecular functions based on the measurements of intermolecular dynamics, such as THz-TDS, fs-RIKES, microwave dielectric relaxation and NMR, and the physicochemical theoretical approach.

3SFA-1 **サブテラヘルツ波照射によるタンパク質水和への非熱的作用：誘電緩和測定に基づいた研究**
Nonthermal Effect of Sub-THz Irradiation on Protein Hydration: Study Based on Dielectric Relaxation Measurements
○今清水 正彦, 杉山 順一, 田中 真人（産総研）
Masahiko Imashimizu, Jun-ichi Sugiyama, Masahito Tanaka (*AIST*)

3SFA-2　**サブテラヘルツ波照射された水溶液中のタンパク質の NMR 法を用いた動的構造解析**
Analyses of structural dynamics of proteins in aqueous solution irradiated with sub-THz electromagnetic waves by using NMR spectroscopy
○徳永 裕二 [1], 竹内 恒 [1], 今清水 正彦 [2]（[1] 東京大学大学院薬学系研究科, [2] 産業技術総合研究所生命分子工学研究部門）
Yuji Tokunaga[1], Koh Takeuchi[1], Masahiko Imashimizu[2] ([1]*Grad. Sch. Pharm. Sci., UTokyo*, [2]*CMB, AIST*)

3SFA-3　**水和イオン液体の含水率による生体分子の溶解性と構造変化**
Solubility and structural changes of biomolecules as a function of water content in hydrated ionic liquids
○藤田 恭子（東京薬科大学　薬学部）
Kyoko Fujita (*Tokyo University of Pharmacy and Life Sciences*)

3SFA-4　**フェムト秒ラマン誘起カー効果分光による凝縮相の低振動数ダイナミクスの観測：生体分子に向けて**
Probing the low-frequency dynamics in condensed phases by femtosecond Raman-induced Kerr effect spectroscopy: Toward biomolecules
○城田 秀明（千葉大・院理）
Hideaki Shirota (*Grad. Sch. Sci., Chiba University*)

3SFA-5　WATER: THE FORGOTTEN BIOLOGICAL MOLECULE THAT CONTROLS LIFE
Biman Bagchi (*Indian Institute of Science, Bengaluru*)

3SFA-6　**タンパク質の構造安定化に対する水和水の役割**
Role of Hydration Water in Protein Conformational Stabilization
○菱田 真史（東京理科大学理学部化学科）
Mafumi Hishida (*Dept. Chem., Tokyo Univ. Sci.*)

3SHA　生体膜の生物物理呼応～生命活動における形と動き～
Biophysical membrane responses: structure and motion in biological activity

オーガナイザー：中瀬 生彦（大阪公立大学），川口 祥正（京都大学）
Organizers: Ikuhiko Nakase (Osaka Metro. Univ.), Yoshimasa Kawaguchi (Kyoto Univ.)

09:00～11:30
H 会場（会議室 234（2 号館 3F））／Room H（Conference Room 234 (Bldg. 2, 3F)）

In biological activity, biomembranes participate in responses for acceptance/rejection of stimulation and structural formations including e.g., cellular uptake, migration, proliferation, and cell death. Understanding and controlling biophysical responses/mechanisms-based membrane systems are highly anticipated to be next-generation therapeutic methodologies for further achievements of disease regulation such as cancers. In this proposal symposium, advanced research technologies and achievements of visualizing and controlling membrane traffic, release of extracellular vesicles, self-organization of tissue formation, exploiting physics and physical chemistry for imaging and analysis of membrane characterization with antimicrobial peptides, biophysical assessment and biological applications (especially drug delivery) of membrane disruptive peptides from the fusion viewpoints of biophysics, molecular cell biology, chemistry, and chemical biology will be presented, and membrane-based therapeutic methodology will be discussed.

はじめに
Opening Remarks

3SHA-1　抗菌ペプチド LL-37 vs HNP1 間ダブルコオペラティブ効果の原理解明
The mechanistic studies of double cooperative effect between antimicrobial peptides LL-37 and HNP1
○杉原 加織（東大生研）
Kaori Sugihara (*IIS, The Univ. of Tokyo*)

3SHA-2　培養場の制御による細胞集団行動の制御
Control of collective cell migration by cell-ECM interactions
○萩原 将也（理化学研究所）
Masaya Hagiwara (*RIKEN*)

3SHA-3　膜傷害性ペプチドを鋳型とした細胞質送達ペプチドの開発
Development of cytosolic delivery peptides by attenuated membrane lytic activity
○川口 祥正, 二木 史朗（京大・化研）
Yoshimasa Kawaguchi, Shiroh Futaki (*Inst. Chem. Res., Kyoto Univ.*)

3SHA-4　抗菌ペプチドによる脂質膜への選択的作用：粗視化分子動力学シミュレーション
Selective action of antimicrobial peptides on lipid membranes: Coarse-grained molecular dynamics study
○篠田 渉（岡山大・基礎研）
Wataru Shinoda (*RIIS, Okayama Univ.*)

3SHA-5　上皮細胞からのエクソソームの非対称分泌の分子機構
Molecular mechanisms of asymmetrical exosome release from polarized epithelial cells
○福田 光則（東北大院・生命科学）
Mitsunori Fukuda (*Grad. Sch. Life Sci., Tohoku Univ.*)

おわりに
Closing Remarks

3SJA　光合成の多様な環境への適応原理
Understanding the Principles of the Adaptation of Photosynthesis to Diverse Environments

共催 学術変革領域研究（A）「光合成ユビキティ」

オーガナイザー：広瀬 侑（豊橋技術科学大学），栗栖 源嗣（大阪大学）
Organizers: Yuu Hirose (Toyohashi Univ. of Tech.), Genji Kurisu (Osaka Univ.)

09:00〜11:30
J 会場（会議室 141+142（1 号館 4F））／Room J（Conference Room 141+142 (Bldg. 1, 4F)）

Photosynthetic organisms synthesize organic compounds from water and carbon dioxides using solar energy. They adapted and expanded over a wide range of environments and sustain all living organisms on Earth. The structure and function of photosynthetic apparatus change dynamically in response to environmental conditions. In 2023, researchers from structural biology, plant physiology, biochemistry, and bioinformatics have teamed up to launch a new research project, "Photosynthetic Ubiquity", which is supported by Grant-in-Aid for Transformative Research Areas (A) from JSPS. In this symposium, the members of this project will discuss approaches to elucidate the molecular principles of adaptation of photosynthetic supramolecular complexes to diverse environments.

3SJA-1 Structure of cyanobacterial photosystem I complexed with ferredoxin and cytochrome c6 at 1.97 Å resolution

Jiannan Li[1,2], Noriyuki Hamaoka[1,2], Fumiaki Makino[3,4], Akihiro Kawamoto[1,2], Keiichi Namba[3,4,5], Christoph Gerle[1], **Genji Kurisu[1,2,5]** ([1]*Inst. Prot. Res., Osaka Univ.*, [2]*Grad. Sch. Sci., Osaka Univ.*, [3]*Grad. Sch. Front. Bio., Osaka Univ.*, [4]*JEOL Co., Ltd.*, [5]*JEOL YOKOGUSHI Res. Lab., Osaka Univ.*)

3SJA-2 チラコイド膜における動的高次分子構造の高速 AFM による可視化

Visualization of dynamic higher-order molecular structure of thylakoid membranes by HS-AFM

○山本 大輔, 西谷 雄大（福岡大・理）

Daisuke Yamamoto, Yudai Nishitani (*Fac. Sci., Fukuoka Univ.*)

3SJA-3 光合成光捕集蛋白質における環境適応機構の解明

Understanding environmental adaptation mechanisms in photosynthetic light-harvesting proteins

○斉藤 圭亮 [1,2], 辻村 真樹 [1], 鍵本 拓海 [1], 石北 央 [1,2]（[1] 東大・先端研, [2] 東大・院工）

Keisuke Saito[1,2], Masaki Tsujimura[1], Takumi Kagimoto[1], Hiroshi Ishikita[1,2] ([1]*RCAST, Univ. Tokyo*, [2]*Grad. Sch. Sci., Univ. Tokyo*)

3SJA-4 祖先型タンパク質による生命マシナリーの環境適応戦略の解読

Decoding the environmental adaptation strategies of biological machineries via ancestral proteins

土屋 裕子 [1], 嶺井 隆平 [2], 土方 敦司 [3], ○白井 剛 [2]（[1] 産総研・人工知能研究センター, [2] 長浜バイオ大・バイオサイエンス, [3] 東薬大・生命科学）

Yuko Tsuchiya[1], Ryuhei Minei[2], Atsushi Hijikata[3], **Tsuyoshi Shirai[2]** ([1]*Artificial Intelligence Research Center (AIRC), National Institute of Advanced Industrial Science and Technology (AIST)*, [2]*Department of Bio-science, Nagahama Institute of Bio-Science and Technology*, [3]*School of Life Sciences, Tokyo University of Pharmacy and Life Sciences*)

3SJA-5 構造から紐解くシアノバクテリアの光色順化

Structural basis of chromatic acclimation in Cyanobacteria

○広瀬 侑（豊橋技科大・院工）

Yuu Hirose (*Toyohashi Univ. of Tech. Dept. of Eng.*)

3SKA 我ら地球生物の可能性～極限微生物から人工細胞まで～

Our Potential as Earthly Organisms: From Extremophile Microbes to Artificial Cells

共催 CREST/さきがけ「ゲノム合成」

オーガナイザー：市橋 伯一（東京大学），鈴木 志野（宇宙航空研究開発機構）

Organizers: Norikazu Ichihashi (The Univ. of Tokyo), Shino Suzuki (JAXA)

09:00～11:30

K 会場（会議室 131+132（1 号館 3F））／Room K（Conference Room 131+132 (Bldg. 1, 3F)）

The recent discovery of new microorganisms with extraordinary characteristics has extended the possibility of living organisms on Earth. Similarly, the recent synthesis of artificial cellular and non-cellular systems has revealed what life could potentially be. As a result of these studies, we have come to realize that the potential of living systems on Earth, including human beings, is much greater than previously thought. In this symposium, we have invited researchers who are actively studying microorganisms in extraordinary habitats or synthesizing artificial systems with extraordinary properties. We hope that this symposium will provide an opportunity for researchers from different fields to broaden their perspectives on living things.

はじめに
Opening Remarks

3SKA-1 **試験管内でセントラルドグマを作ってみて分かったこと**
Lessons from the In vitro construction of the “Central dogma”
○市橋 伯一 [1,2,3]（[1] 東大・総合文化, [2] 東大・先進科学, [3] 東大・生物普遍）
Norikazu Ichihashi[1,2,3] ([1]*Grad. Sch. Arts and Sci, Univ Tokyo*, [2]*KIS, Univ Tokyo*, [3]*UBI, Univ Tokyo*)

3SKA-2 **南極藻類の赤外線利用型光合成メカニズム**
Uphill energy transfer mechanism for photosynthesis performed by far-red light in an Antarctic alga
○小杉 真貴子 [1], 川崎 政人 [2], 柴田 穣 [3], 原 光二郎 [4], 高市 真一 [5], 安達 成彦 [2], 守屋 俊夫 [2], 亀井 保博 [6], 工藤 栄 [7], 菓子野 康浩 [8], 小池 裕幸 [9], 千田 俊哉 [2], 大谷 修司 [10], 豊田 敦 [11], 西出 浩世 [12], 皆川 純 [1]（[1] 基生研・環境光, [2] 高エネ機構・構造生物, [3] 東北大・理, [4] 秋田県立大・生物資源, [5] 東京農大・生命, [6] 基生研・超階層生物, [7] 極地研・生物圏, [8] 兵庫県立大・理, [9] 中央大・理工, [10] 島根大・教育, [11] 遺伝研・ゲノム・進化, [12] 基生研・データ統合）
Makiko Kosugi[1], Masato Kawasaki[2], Yutaka Shibata[3], Kojiro Hara[4], Shinichi Takaichi[5], Naruhiko Adachi[2], Toshio Moriya[2], Yasuhiro Kamei[6], Sakae Kudoh[7], Yasuhiro Kashino[8], Hiroyuki Koike[9], Toshiya Senda[2], Syuji Ohtani[10], Atsushi Toyota[11], Hiroyo Nishide[12], Jun Minagawa[1]
([1]*Div. Env. Photosyn., NIBB*, [2]*SBRC, IMSS, KEK*, [3]*Fac. Sci., Tohoku Univ.*, [4]*Fac. Biores. Sci., Akita Pref. Univ.*, [5]*Fac. Life Sic., Tokyo Univ. Agri.*, [6]*Trans-Scale Biol., NIBB*, [7]*Biosci., NIPR*, [8]*Grad. Sch. Sci., Univ. Hyogo*, [9]*Fac. Sci. Engineering, Chuo Univ.*, [10]*Fac. Education, Shimane Univ.*, [11]*Dep. Genomics Evolution. Biol., NIG*, [12]*Data Integ. Analys. Fac., NIBB*)

3SKA-3 i[3]-screening for an emergent protein function designed by an ML-based generative model
Shunshi Kohyama, Béla Frohn, Leon Babl, Petra Schwille (*Max Planck Institute of Biochemistry*)

3SKA-4 **試験管内合成とタンパク質光操作による人工細胞膜の機能拡張**
Functionalizing artificial cell membrane with cell-free synthesis and light-inducible proteins
○松林 英明（東北大学・学際研）
Hideaki Matsubayashi (*FRIS, Tohoku Univ.*)

3SKA-5 **ウイルス集団内におけるゲノム配列の分布**
Distribution of genomic sequences within a viral population
○田端 和仁（東京大学大学院工学系研究科応用化学専攻）
Kazuhito Tabata (*Department of Applied Chemistry, The University of Tokyo*)

3SKA-6 **酵母を用いた難培養性細菌の全ゲノムクローニング**
Whole genome cloning of unculturable bacteria in yeast
○水谷 雅希 [1], 宮腰 かおり [1], 古賀 隆一 [1], 深津 武馬 [1,2,3], 柿澤 茂行 [1]（[1] 産業技術総合研究所・生物プロセス研究部門, [2] 東京大学大学院理学系研究科・生物科学専攻, [3] 筑波大学大学院・生命環境科学系）
Masaki Mizutani[1], Kaori Miyakoshi[1], Ryuichi Koga[1], Takema Fukatsu[1,2,3], Shigeyuki Kakizawa[1]
([1]*Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)*, [2]*Department of Biological Sciences, Graduate School of Science, The University of Tokyo*, [3]*Graduate School of Life and Environmental Sciences, University of Tsukuba*)

3SKA-7 **鉱物を利用した炭素固定：超還元環境に生きる微生物のもつ効率的な細胞外電子授受蛋白質**
Carbon Fixation Using Minerals: efficient extracellular electron transfer protein in archaea associated with ultra-reducing environments
○鈴木 志野 [1,2]（[1] 宇宙航空研究開発機構・宇宙研, [2] 理研・開拓研究本部,）
Shino Suzuki[1,2] ([1]*ISAS, JAXA*, [2]*CPR, Riken*)

おわりに
Closing Remarks