シンポジウム　Symposium

第 1 日目（11 月 25 日（金））／Day 1（Nov. 25 Fri.）

9:00〜11:30　A 会場（中ホール 200）／Room A (Convention Hall 200)
1SAA　神経活動イメージングの最先端：新規ツールとその活用
Advances in imaging neuronal activity: New tools and applications

オーガナイザー：ベアン クン（沖縄科学技術大学院大学学園），冨永 貴志（徳島文理大学）
Organizers: Kuhn Bernd (OIST Graduate University), Takashi Tominaga (Tokushima Bunri University)

Functional optical imaging is revolutionizing neuroscience. Every year new molecular or optical tools are added or improved and allow to study the biophysics of biological processes which were not accessible before. This symposium gives a snapshot of some of these current developments. Experts from probe design and methods development as well as from the interface of methods development and neuroscience will report their latest results. The symposium focuses on voltage and calcium probe design and imaging, two-photon optogenetics and FRET/FLIM, molecular orientation imaging, and birefringence imaging.

1SAA-01　「使える」膜電位感受性色素による神経回路解析法
“Conventional” voltage sensitive dye imaging of neural circuit activity
○冨永 貴志, 冨永 洋子（徳島文理大・神経研）
Takashi Tominaga, Yoko Tominaga (*Inst. Neurotic., Tokushima Bunri Univ.*)

1SAA-02　Tuning Genetically-Encoded Voltage Indicators to Better Resolve Different Types of Neuronal Activity
Bradley Baker (*KIST*)

1SAA-03　新規偏光顕微鏡を用いたマウス海馬スライスにおけるシナプス活動の非侵襲的計測
Imaging of neuronal activity in mice hippocampal slices by instantaneous polarized light microscopy
○小池（谷） 真紀[1], Mehta Shalin[1], Oldenburg Rudolf[1], 冨永 貴志[2], 谷 知己[1]（[1]ウッズホール海洋生物学研究所, [2]徳島文理大学）
Maki Koike-Tani[1], Shalin Mehta[1], Rudolf Oldenburg[1], Takashi Tominaga[2], Tomomi Tani[1] ([1]*Marine Biological Laboratory*, [2]*Tokushima Bunri University*)

1SAA-04　光活性化酵素制御とイメージング技術による cAMP/cGMP の時空間的機能探索
Two-photon optogenetic control and live imaging of postsynaptic cAMP/cGMP intracellular messengers
○岡本 賢一（LTRI, MSH）
Kenichi Okamoto (*LTRI, MSH*)

1SAA-05　in vivo calcium imaging with genetically encoded calcium indicators
Junichi Nakai[1,2], Keiko Gengyo-Ando[1,2], Masaaki Sato[1,2], Masamichi Ohkura[1,2] ([1]*Grad. Sch. Sci. Eng. Saitama Univ.*, [2]*BBSSI, Saitama Univ.*)

1SAA-06　Exploring input-output relations of neurons in awake mice
Christopher J. Roome, **Bernd Kuhn** (*Kuhn Unit, OIST*)

9:00〜11:30　B 会場（中会議室 202）／Room B (Conference Room 202)
1SBA　全細胞解析によるマイノリティ細胞の解明
Minority cell research enabled by exhaustive analyses of all cells

オーガナイザー：永井 健治（大阪大学），上田 泰己（東京大学）
Organizers: Takeharu Nagai (Osaka University), Hiroki Ueda (The University of Tokyo)

If we carefully observe the cell population that at first glance looks uniform and homogeneous, we may find small number of heterogeneous cells with a different nature. Moreover, this minority cells would sometimes significantly alter the behavior of the whole cell population. In this symposium, we would like to discuss not only analytical methods for sensitive detection or visualization of such minority cells, but also the theories regarding principle or mechanism how the minority cells are generated and exert biological roles.

1SBA-01 全身・全脳透明化の先に見えてくるもの～生命の『時間』の謎の解明に向けて～
Toward Organism-level Systems Biology in Mammals～Whole-body and whole-organ clearing and imaging with single-cell resolution～
○上田 泰己[1,2]（[1]東京大学, [2]理化学研究所）
Hiroki R. Ueda[1,2] ([1]*The University of Tokyo*, [2]*RIKEN (QBiC)*)

1SBA-02 4K/8K CMOS イメージングによるマルチスケール生体全細胞解析
Multi-scale in vivo 4K/8K imaging analysis
○西村 智[1,2]（[1]自治医科大学, [2]東大）
Satoshi Nishimura[1,2] ([1]*Jichi Med. Univ.*, [2]*The Univ. of Tokyo*)

1SBA-03 マイノリティ細胞の同定と解析による自己免疫疾患発症制御機構の解明
Elucidation of pathomechanisms of autoimmunity by minority cell research
○岡崎 拓（徳島大学先端酵素学研究所免疫制御学分野）
Taku Okazaki (*Division of Immune Regulation, Institute for Genome Research, Tokushima University*)

1SBA-04 Raman spectroscopic approaches to label-free cell characterization and finding functional minorities
Katsumasa Fujita (*Osaka University*)

1SBA-05 マイノリティ細胞研究にむけた神経細胞および脳組織内在性グルタミン酸受容体の蛍光可視化
Visualization of native glutamate receptors in live neurons or neuronal tissues for minority cell study
○清中 茂樹（京大・院工）
Shigeki Kiyonaka (*Grad. Sch. Eng., Kyoto Univ.*)

1SBA-06 超解像生理機能イメージング法の開発とマイノリティ細胞の可視化の試み
Development of superresolution techniques for imaging physiological functions toward visualization of minority cells
○永井 健治（大阪大学産業科学研究所）
Takeharu Nagai (*ISIR, Osaka Univ.*)

1SBA-07 Finding genomic minority cells by sequencing
Katsuyuki Shiroguchi[1,2,3] ([1]*RIKEN Quantitative Biology Center*, [2]*RIKEN Center for Integrative Medical Sciences*, [3]*JST PRESTO*)

1SBA-08 1 細胞ラマン分光イメージングから如何にして細胞の個性を定量化するか？
How can one quantify cell individuality from Single Cell Raman Imaging?
○小松崎 民樹[1,2]（[1]北大 電子研 社会創造数学センター, [2]北大 生命）
Tamiki Komatsuzaki[1,2] ([1]*Hokkaido Univ., RIES, MSC*, [2]*Hokkaido Univ., Grad. Sch. Life Sci.*)

9:00～11:30　D 会場（中ホール 300）／Room D (Convention Hall 300)

1SDA　原子からいのちへ：21 世紀の新しい生命観を求めて
From atoms to life: Exploring a new view of life in the 21st century

オーガナイザー：赤坂 一之（京都府立大学），伏見 譲（総合研究大学院大学）
Organizers: Kazuyuki Akasaka (Kyoto Prefectural University), Yuzuru Husimi (SOKENDAI)

Biomolecular science in the last century has revolutionized our approach to life: Today in biochemical and medical societies, crucial life phenomena are being discussed in terms of changes in macromolecular structures and interactions, and even of motions of individual atoms. How can the basically random thermal motions of atoms derive the macromolecular machinery into the dynamism of life? How in nature is the connection between atoms and life made generally possible? In this symposium, we intend to share our thoughts with the audience of all ages.

はじめに
赤坂 一之
Kazuyuki Akasaka

1SDA-01 蛋白質―無秩序な原子の動きを“命の動き”に変えるデバイス
Proteins-converting random motions of atoms into the dynamism of life
○赤坂 一之（京都府立大・院生命環境科学）
Kazuyuki Akasaka (*Kyoto Prefectural University*)

1SDA-02 分子と細胞、そして細胞と組織をつなぐメカニカルシグナル
Mechanical signals interface molecules with cells, and cells with tissues
○曽我部 正博（名大院・医）
Masahiro Sokabe (*Nagoya Univ. Grad. Sch. Med.*)

1SDA-03 分子情報システムとしての生命
Which parameters characterize“life”?
○美宅 成樹（サイエンスライター）
Shigeki Mitaku (*Science writer*)

1SDA-04 情報進化―原子といのちを結ぶ進化能的生命観―
Informational Evolution: An evolvability view point of life composed of atoms
○伏見 譲（総研大）
Yuzuru Husimi (*SOKENDAI*)

おわりに
伏見 譲
Yuzuru Husimi

9:00～11:30　E 会場（小会議室 303）／Room E (Conference Room 303)

1SEA　新学術領域研究「シリア・中心体系による生体情報フローの制御」共催
運動性鞭毛・繊毛の最前線―生体ナノマシンの制御機構―
Frontiers in motile cilia – regulatory mechanisms of bio-nanomachines –

オーガナイザー：小田 賢幸（山梨大学），若林 憲一（東京工業大学）
Organizers: Toshiyuki Oda (University of Yamanashi), Ken-ichi Wakabayashi (Tokyo Institute of Technology)

Cilia and flagella are conserved motile organelles that play essential roles in cellular motility of eukaryotes and development of higher organisms by generating fluid flow. The beating motion of cilia/flagella is driven by dyneins, whose activities are tightly regulated by complex molecular mechanisms. In this symposium, leading young scientists will present their recent findings regarding the ciliary/flagellar motility and its regulatory mechanisms in various model organisms.

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opening remarks
若林 憲一
Ken-ichi Wakabayashi

1SEA-01 多細胞性緑藻ボルボックスの走光性：5000 の細胞が協調して泳ぐには？
Phototaxis in the multicellular green alga *Volvox*: How 5000 independent cells coordinate their motion?
○植木 紀子（東工大・化生研）
Noriko Ueki (*CLS, Tokyo Tech.*)

1SEA-02 繊毛の運動を支える細胞内構造の理解へ向けて
Towards understanding of cell structure that governs motion pattern of motile cilia
○篠原 恭介（東京農工大学）
Kyosuke Shinohara (*Tokyo University of Agriculture and Technology*)

1SEA-03 Roles of calcium in the regulation of sperm flagellar movement
Kogiku Shiba (*SMRC, Tsukuba Univ.*)

1SEA-04 IFT81 および IFT74 の N 末端領域によるチューブリンの鞭毛内輸送
The IFT81 and IFT74 N-termini together form the main module for intraflagellar transport (IFT) of tubulin
○久保 智広[1,4], Brown Jason[1,2], Bellve Karl[1], Craige Branch[1], Craft Julie[3], Forgarty Kevin[1], Lechtreck Karl[3], Witman George[1]
([1]マサチューセッツ大学・医, [2]セイラム州立大, [3]ジョージア大, [4]山梨大・医)
Tomohiro Kubo[1,4], Jason Brown[1,2], Karl Bellve[1], Branch Craige[1], Julie Craft[3], Kevin Forgarty[1], Karl Lechtreck[3], George Witman[1] ([1]*UMASS Med.*, [2]*Salem State Univ.*, [3]*Univ. of Georgia*, [4]*Univ. of Yamanashi Faculty of Medicine*)

1SEA-05 繊毛・鞭毛の中の動きを見る
Dynamics of molecules inside cilia and flagella
○高尾 大輔（遺伝研）
Daisuke Takao (*NIG*)

1SEA-06 脊椎動物運動性繊毛における PIH タンパク質の機能解析
The function of PIH proteins in the vertebrate motile cilium
○山口 博史[1,2], 山崎 陽祐[1], 小田 賢幸[1,3], 吉川 雅英[1], 武田 洋幸[2]（[1]東大・院医, [2]東大・院理, [3]山梨大・院医）
Hiroshi Yamaguchi[1,2], Yousuke Yamazaki[1], Toshiyuki Oda[1,3], Masahide Kikkawa[1], Hiroyuki Takeda[2] ([1]*Grad. Sch. Med., Univ. Tokyo*, [2]*Grad. Sch. Sci., Univ. Tokyo*, [3]*Grad. Sch. Med., Univ. Yamanashi*)

closing remarks
小田 賢幸
Toshiyuki Oda

9:00〜11:30　F 会場（中会議室 406）／Room F (Conference Room 406)
1SFA　生物物理遺伝学：生物物理学的ゲノム情報科学としての
Biophysical Genetics as a Genome Informatics Supported by Biophysics

オーガナイザー：中井 謙太（東京大学），白井 剛（長浜バイオ大学）
Organizers: Kenta Nakai (The University of Tokyo), Tsuyoshi Shirai (Nagahama Institute of Bio-Science and Technology)

Since genetic information can be treated independently of the physical nature of its carrier DNA, the progress of genome information science has deviated to a certain extent from that of biophysics. The situation, however, has been changed recently because the importance of epigenome information, which is tightly linked with the 3D conformation of carrier DNA, i.e., the chromatin structure, has been recognized increasingly. Thus, in this symposium, we will celebrate the birth of a new field, biophysical genetics, inviting active researchers in it.

はじめに
中井 謙太
Kenta Nakai

1SFA-01 クロマチンの三次元構造と動的構造
Three dimensional structures and dynamics of chromatin
○胡桃坂 仁志（早稲田大学理工学術院 先進理工学部）
Hitoshi Kurumizaka (*Waseda University, Faculty of Science and Engineering*)

1SFA-02 Hi-C データを用いた遺伝子発現制御の理解
Using Hi-C data to understand gene regulation
○須山 幹太（九州大学 生体防御医学研究所）
Mikita Suyama (*Medical Institute of Bioregulation*)

1SFA-03 Waves of chromatin remodeling in mouse dendritic cells in response to LPS stimulation
Alexis Vandenbon (*IFReC, Osaka University*)

1SFA-04 出芽酵母 *yku70 esc1* 変異型における遺伝子発現の変化を引き起こすメカニズム
Mechanisms for the misregulated gene expression in the *yku70 esc1* mutant of budding yeast
○徳田 直子, 笹井 理生（名古屋大学）
Naoko Tokuda, Masaki Sasai (*Nagoya University*)

1SFA-05 刺激された血管内皮細胞における核内構造のダイナミクス
Dynamics of chromatin structure in stimulated vascular endothelial cells
◯和田 洋一郎[1,2], 中田 庸一[3], 大田 佳宏[3], 井原 茂男[2,3]（[1]東京大学アイソトープ総合センター, [2]先端科学技術研究センター, [3]東京大学大学院数理科学研究科）
Youichiro Wada[1,2], Youichi Nakata[3], Yoshihiro Ohta[3], Sigeo Ihara[2,3] ([1]*Isotope Science Center, The University of Tokyo*, [2]*Research Center for Advanced Science and Technology, The University of Tokyo*, [3]*Graduate School of Mathematical Sciences, The University of Tokyo*)

総合討論, おわりに
白井 剛
Tsuyoshi Shirai

9:00〜11:30　G 会場（小会議室 405）／Room G (Conference Room 405)

1SGA　蛋白質工学を用いた会合と溶解性の最新の研究
Advances in the engineering of protein oligomerization and solubility

オーガナイザー：黒田 裕（東京農工大学），赤沼 哲史（早稲田大学）
Organizers: Yutaka Kuroda (Tokyo University of Agriculture and Technology), Satoshi Akanuma (Waseda University)

Aggregation, oligmorization, and solubility are important issues in protein research. However, much of the present research on these phenomena focuses on amyloidogenic or crystalline aggregation. This workshop will introduce recent studies on amorphous protein aggregation, protein solubility, as well as the control and design of protein oligomers. We hope that it will provide an opportunity to decipher biophysical mechanisms governing these phenomena, and that it will shed insight into mechanisms that are common to amyloidogenic/crystalline aggregation and those that are not.

1SGA-01 序論
Introduction
◯赤沼 哲史（早大 人間）
Satoshi Akanuma (*Faculty of Hum. Sci., Waseda Univ.*)

1SGA-02 脂質膜のアミロイド線維形成への影響
The effects of lipid membranes on the fibrillation of amyloidogenic proteins
◯寺川（鈴木） まゆ（ウィールコーネルメディスン）
Mayu S. Terakawa (*Weill Cornell Medicine, Biochemistry*)

1SGA-03 新規タンパク質分子間結合面の創成と人工タンパク質繊維の作成
De-novo design of a protein-protein interface and creation of protein fibrils
◯八木 創太[1], 赤沼 哲史[2], 内田 達也[3], 山岸 明彦[1]（[1]東薬大 応用生命, [2]早大 人間, [3]東薬大 分子生命）
Sota Yagi[1], Satoshi Akanuma[2], Tatsuya Uchida[3], Akihiko Yamagishi[1] ([1]*Tokyo Univ. Pharm. Life Sci., Dep. Appl. Life Sci.*, [2]*Waseda Univ., Facul. Hum. Sci.*, [3]*Tokyo Univ. Pharm. Life Sci., Dep. Mol. Life Sci.*)

1SGA-04 人工タンパク質をブロックに見立てた超分子ナノ構造複合体の設計構築
Design and construction of supramolecular nanostructures by using *de novo* protein nanobuilding blocks
小林 直也, 木村 尚弥, ◯新井 亮一（信州大・繊維・応用生物）
Naoya Kobayashi, Naoya Kimura, **Ryoichi Arai** (*Appl. Biol., Tex. Sci. & Tech., Shinshu Univ.*)

1SGA-05 時間分解小角 X 線小角散乱法を用いたフェリチンの会合機構の解析
Ferritin assembly mechanism studied by time-resolved small-angle X-ray scattering
◯佐藤 大輔, 池口 雅道（創価大・理工）
Daisuke Sato, Masamichi Ikeguchi (*Fac. of Sci. and Eng., Soka Univ.*)

1SGA-06 ペプチド溶解性の全原子分子動力学シミュレーション及びその実験的検証
Large scale molecular dynamics of peptide solubility and its experimental assessment
◯黒田 裕（東京農工大学工学部生命工学科）
Yutaka Kuroda (*Dept. Biotech. Life Sci., TUAT*)

1SGA-07 熱測定による高温で可逆的に形成される蛋白質の会合体の検出
High-temperature reversible oligomerization of proteins detected by calorimetry
○城所 俊一[1], 中村 成芳[1,2]（[1]長岡技科大・生物, [2]北九州高専・生産デザイン）
Shun-ichi Kidokoro[1], Shigeyoshi Nakamura[1,2] ([1]*Dept. Bioeng., Nagaoka Univ. Tech.*, [2]*Dept. Creat. Eeng., Natl. Inst. Tech. Kitakyushu College*)

1SGA-08 終わりに
Concluding Remarks
○有坂 文雄（日大生物資源科学）
Fumio Arisaka (*Nihon U. Biores. Sci.*)

16:30～19:00　A 会場（中ホール 200）／Room A (Convention Hall 200)

1SAP　細胞同士の絡み合いから理解する集団運動の生物物理学
Biophysics of collective cell movement - From single-cell to multi-cell dynamics

オーガナイザー：澤井 哲（東京大学），青木 一洋（自然科学研究機構 基礎生物学研究所）
Organizers: Satoshi Sawai (The University of Tokyo), Kazuhiro Aoki (National Institute for Basic Biology, National Institutes of Natural Sciences)

Collective cell movement forms the basis of morphogenesis, wound healing as well as cancer invasion. From what appears as random and variable traits that are specific to certain cell types and species, recent studies have uncovered some of the common elements that underlies the dynamics of cell shape, migration, cell-cell interactions and stemness. The symposium will focus on the dynamics that are highly coordinated between the cells and highlight the most recent and exciting progress by some of the younger scientists in this emerging field.

1SAP-01 Intercellular propagation of ERK activity orients collective cell migration
Kazuhiro Aoki (*OIIB, NIBB, Div. of Quantitative Biology*)

1SAP-02 外力が駆動する細胞集団運動を支えるアクチン細胞骨格制御の解明
Actin interacting protein 1 and cofilin sense the extrinsic stretching force and orient cell rearrangement in Drosophila wing
○杉村 薫[1,2], 井川 敬介[1]（[1]京都大学物質―細胞統合システム拠点, [2]JST・さきがけ）
Kaoru Sugimura[1,2], Keisuke Ikawa[1] ([1]*WPI-iCeMS, Kyoto Univ.*, [2]*JST PRESTO*)

1SAP-03 細胞外基質の粘弾性に応答する上皮細胞の集団運動と 3 次元形態形成
Collective Movement and 3D Morphogensis of Epithelial Cells Responding to Viscoelasticity of the Extracellular Matrix
○芳賀 永（北大・院・先端生命）
Hisashi Haga (*Faculty of Advanced Life Sci., Hokkaido Univ.*)

1SAP-04 マイクロ流体デバイスを用いた細胞性粘菌の集団的細胞運動の解析
Microfluidic analysis of group cell migration in *Dictyostelium*
藤森 大平[1], 中島 昭彦[2], 井元 大輔[1], 石原 秀至[4], ○澤井 哲[1,2,3]（[1]東京大学大学院総合文化研究科 広域科学専攻 相関基礎科学系, [2]東京大学大学院総合文化研究科 複雑系生命システム研究センター, [3]JST さきがけ, [4]明治大学 理工学部）
Taihei Fujimori[1], Akihiko Nakajima[2], Daisuke Imoto[1], Shuji Ishihara[4], **Satoshi Sawai**[1,2,3] ([1]*Dept. Basic Sci., Grad. School of Arts and Sci., Univ. of Tokyo*, [2]*Research Ctr. for Complex Systems Biology, Univ. of Tokyo*, [3]*JST PRESTO*, [4]*School of Sci. Eng., Meiji Univ.*)

1SAP-05 単一ヒト表皮幹細胞からの多層上皮構造の形成原理
A mechanistic principle of multilayered epithelial formation from single human epidermal stem cells
○難波 大輔（東京医科歯科大・難研・幹細胞医学）
Daisuke Nanba (*Tokyo Medical & Dental Univ., Med. Res. Inst., Dept. Stem Cell Biol.*)

1SAP-06 がん細胞の集団的浸潤：病理からの視点
Collective invasion of cancer cells: perspectives from pathology
○榎本 篤（名古屋大・院・医・腫瘍病理）
Atsushi Enomoto (*Dept. Pathol., Nagoya Univ. Grad. Sch. Med.*)

16:30～19:00　B 会場（中会議室 202）／Room B (Conference Room 202)

1SBP　モデル化と操作による高次生命現象の解明への挑戦
Modeling and Manupilation of Life: a Challenge to Unveil Its Complex Mechanism

オーガナイザー：茅 元司（東京大学），井上 尊生（ジョンズ・ホプキンス大学）
Organizers: Motoshi Kaya (The University of Tokyo), Takanari Inoue (Johns Hopkins University)

Measurements of molecular dynamics and decoding of genetic information have been progressively advanced and thus, provided a substantial amount of information in life science field. However, our biological system cannot be interpreted simply by superimposing individual functions revealed by these technologies. Rather, it is a complex system by cooperative interactions among cellular and molecular components. In this symposium, we focus on the constructive modeling approaches and experimental manipulations designed to unveil complex mechanisms of the biological events, such as cell division, blood vessel formation, cellular temperature control, immune reaction, and muscle contraction.

1SBP-01　骨格筋ミオシン間における力発生の同調現象を明らかにする
Molecular mechanism of synchronous force generations among skeletal myosins
○茅 元司（東京大学 大学院理学系研究科）
Motoshi Kaya (*University of Tokyo, Graduate School of Science*)

1SBP-02　体細胞分裂期における細胞質ダイニンの操作
Manipulation of cytoplasmic dynein during mitosis
○清光 智美（名古屋大学大学院理学研究科）
Tomomi Kiyomitsu (*Nagoya University*)

1SBP-03　Intracellular production of synthetic RNA granules by ligand-yielded multivalent enhancers
Takanari Inoue (*Johns Hopkins University*)

1SBP-04　単一細胞内局所加熱による細胞熱応答の原理の解明
The mechanisms of cellular response to temperature changes as revealed by local heating in single cells
○岡部 弘基[1,2], 時 ベイニ[1], 船津 高志[1]（[1]東京大学大学院薬学系研究科, [2]JST さきがけ）
Kohki Okabe[1,2], Beini Shi[1], Takashi Funatsu[1] ([1]*Grad. Sch. Pharm. Sci., Univ. of Tokyo*, [2]*PRESTO, JST*)

1SBP-05　血管のメカニカルストレスによるフィブロネクチンピラー形成
Vascular mechanical stress organizes Fibronectin into pillars bridging tissue gap
○佐藤 有紀[1,2]（[1]九州大学・医学研究院, [2]JST・さきがけ）
Yuki Sato[1,2] ([1]*Grad. Sch. Med. Sci., Kyushu Univ.*, [2]*JST, PRESTO*)

1SBP-06　チューブリンアイソタイプと微小管動態の多様性
Distinct contribution of different tubulin isotypes to microtubule dynamics
○杉本 亜砂子（東北大学・生命科学）
Asako Sugimoto (*Life Sciences, Tohoku Univ.*)

16:30～19:00　C 会場（中会議室 201）／Room C (Conference Room 201)

1SCP　［学会本部企画 I］日本ー中国交流シンポジウム：蛋白質設計とバイオテクノロジーへの応用
[BSJ Special Event I] BSJ – BSC Joint Symposium: Protein Design and its Applications to Biotechnology

オーガナイザー：中村 春木（大阪大学），Xiyun Yan（Institute of Biophysics）
Organizers: Haruki Nakamura (Osaka University), Yan Xiyun (Institute of Biophysics)

In order to make much deeper collaborations between BSJ (Biophysical Society of Japan) and BSC (Biophysical society of China) for promotion of biophysics in a global manner, we start a Joint Bilateral Symposium inviting active researchers from both BSJ and BSC side. This year we focus on the theme “Protein Design and its Applications to Biotechnology”, and both societies invite three speakers, respectively. It is expected to provide a scope on the future biophysics studies in Japan and China.

1SCP-01　Computational design of catalytic triad based organophosphate capture proteins
Chu Wang (*Dept. Chem. Biol., CCME, Peking Univ.*)

1SCP-02 Chemical Probes with Fuorogenic Switches for Visualizing Modified Protein and DNA
Yuichiro Hori[1,2] ([1]*Grad. Sch. Eng., Osaka Univ.*, [2]*IFReC, Osaka Univ.*)

1SCP-03 Self-assembly of protein nanofibrils that display active enzymes
Sarah Perrett (*Inst. Biophys., CAS*)

1SCP-04 アミロイド線維形成初期過程のタンパク質構造化メカニズムの解析
Investigating early steps in amyloid fibril formation
○茶谷 絵理（神戸大院理）
Eri Chatani (*Grad. Sch. Sci., Kobe Univ.*)

1SCP-05 Nanozyme: discovery and its application in tumor diagnosis
Xiyun Yan (*Inst. Biophys., CAS*)

1SCP-06 蛋白質相互作用の熱力学：分子設計と創薬
Thermodynamics of protein interaction for molecular design and therapeutics
○津本 浩平（東京大学）
Kouhei Tsumoto (*The University of Tokyo*)

16:30〜19:10　D 会場（中ホール 300）／Room D (Convention Hall 300)

1SDP　新学術領域研究「ゆらぎと構造の協奏：非平衡系における普遍法則の確立」共催
モーターと細胞骨格の新展開　ステップから集団運動まで
New extremes of motor proteins and cytoskeleton: step into a new realm with steps and collective motions

オーガナイザー：西坂 崇之（学習院大学），永井 健（北陸先端科学技術大学院大学）
Organizers: Takayuki Nishizaka (Gakushuin University), Ken H. Nagai (JAIST)

Novel two directions of motor proteins and cytoskeletons will be presented in this session. One is the collective motions of condensed or regulated cytoskeletons in vivo or in vitro, both of which are characterized by biophysics, non-equilibrium physics and developmental biology. The other extreme is the exploration of the molecular mechanism of new machineries including rotary motors. Also, this symposium briefly represents Dr. Kazuhiko Kinosita Jr's fruitful contribution in this field as its introduction, who passed away last November.

オープニング

1SDP-01 Single molecule analysis of F_oF_1-ATP synthase
Rikiya Watanabe[1,2] ([1]*Department of Applied Chemistry, The University of Tokyo*, [2]*PRESTO, JST*)

1SDP-02 *De novo* 設計軸の回転から明らかになったトルク発生機構
Rotation of *de novo* designed axis and the torque generation mechanism
○岸川 淳一, 馬場 みほ里, 中西 温子, 横山 謙（京産大・総合生命・生命シス）
Jun-ichi Kishikawa, Mihori Baba, Atsuko Nakanishi, Ken Yokoyama (*Dept. LifeSci, Kyoto Sangyo Univ.*)

1SDP-03 滑走バクテリアと遊泳アーキアの運動超分子マシナリーの単位ステップ観察
Unitary steps of supramolecular-motility machineries in gliding bacteria and swimming archaea
○木下 佳昭[1], 中根 大介[1], 内田 就也[2], 宮田 真人[3], 西坂 崇之[1]（[1]学習院大学 理・物理, [2]東北大学 理・物理, [3]大阪市立大学 院理・細胞機能）
Yoshiaki Kinosita[1], Daisuke Nakane[1], Nariya Uchida[2], Makoto Miyata[3], Takayuki Nishizaka[1] ([1]*Dept. Phys., Gakushuin University*, [2]*Dept. Phys., Tohoku University*, [3]*Dept. Biol., Graduate School of Science, Osaka City University*)

1SDP-04 A small stroke for an individual, but giant motion for a population: negative gravitaxis and bioconvection of Chlamydomonas reinhardtii
Azusa Kage (*Dept. Finemechanics, Tohoku Univ.*)

1SDP-05 インビトロ運動アッセイ中の自走する微小管の集団運動
Collective motion of running microtubules in in vitro motility assay
○永井 健（北陸先端大・先端理工）
Ken Nagai (*Sch. Mater. Sci., JAIST*)

1SDP-06 胚発生過程における細胞集団運動を担うアクトミオシンの制御機構
Local regulation of actomyosin for the globally orchestrated collective cell movement during tissue morphogenesis
○進藤 麻子[1], Wallingford John[2], 木下 専[1]（[1]名大・院・ 生命理学, [2]テキサス大）
Asako Shindo[1], John Wallingford[2], Makoto Kinoshita[1] ([1]*Grad. Sch. Sci., Nagoya Univ.*, [2]*UT Austin*)

1SDP-07 Shape Remodeling of Active Cytoskeletal Vesicles
Andreas Bausch (*Lehrstuhl für Biophysik, TU München*)

16:30〜19:00　E 会場（小会議室 303）／Room E (Conference Room 303)

1SEP　新学術領域研究「3D 活性サイト科学」共催
時空間精密構造解析による生体分子活性サイトの機能解明
Understanding biochemical functions of the active sites in biomolecular systems by spatial–temporal analysis

オーガナイザー：鷹野 優（広島市立大学），久保 稔（理化学研究所）
Organizers: Yu Takano (Hiroshima City University), Minoru Kubo (RIKEN)

Biomolecules have a rich diversity of functional dynamics, from a large domain movement to a small local structural change. The latter dynamics includes a sub-angstrom change in the active site, which is crucial to control its electronic state and reactivity. Recent advances in crystallography, single-molecule imaging, spectroscopy, and computer simulation allow us to analyze the high-resolution structures, chemical properties, and complex dynamics of biomolecules, and to better understand the coupling between macroscopic and microscopic events. We discuss how these methods can describe the biochemical functions of the active sites.

1SEP-01 Elucidation of structure-function relationship of biological active sites by molecular simulation
Yu Takano[1,2], Yusuke Kanematsu[1], Yasuhiro Imada[2] ([1]*Grad. Sch. Info. Sci., Hiroshima City Univ.*, [2]*IPR, Osaka Univ.*)

1SEP-02 Structural analysis of photosystem II to reveal the mechanism of light-induced water-splitting
Fusamichi Akita[1], Michihiro Suga[1], Keitaro Yamashita[2], Go Ueno[2], Hironori Murakami[2], Yoshiki Nakajima[1], Yasufumi Umena[1], Kunio Hirata[2], Minoru Kubo[2], Kazuya Hasegawa[2], Masaki Yamamoto[2], Hideo Ago[2], Jian-Ren Shen[1] ([1]*RIIS, Okayama Univ.*, [2]*Riken Harima*)

1SEP-03 X 線 1 分子追跡法によるマルチマータンパク質・機能的運動の可視化
Active 3D Motion Visualization of Multimeric Proteins by X-ray Single Molecule Tracking
○関口 博史（高輝度光科学研究センター）
Hiroshi Sekiguchi (*JASRI/SPring-8*)

1SEP-04 蛍光 X 線ホログラフィーによるヘモグロビンの金属周辺構造の可視化
Visualization by X-ray fluorescence holography of metal environments in hemoglobin
○佐藤 文菜[1], 柴山 修哉[1], 八方 直久[2], 林 好一[3], 佐々木 裕次[4]（[1]自治医大, [2]広島市大, [3]名工大, [4]東大）
Ayana Sato-Tomita[1], Naoya Shibayama[1], Naohisa Happo[2], Kouichi Hayashi[3], Yuji C. Sasaki[4] ([1]*Jichi Med. Univ.*, [2]*Hiroshima City Univ.*, [3]*Nagoya Inst. Tech.*, [4]*Tokyo Univ.*)

1SEP-05 マイクロ流路デバイスを用いた時間分解分光法による膜タンパク質の活性サイトの中間体構造解析
Intermediate structures of the active site in membrane proteins revealed by time-resolved spectroscopy with micro-channel devices
○木村 哲就（神戸大・院理）
Tetsunari Kimura (*Grad. Sch. Sci., Kobe Univ.*)

1SEP-06 チトクロム *c* 酸化酵素の時間分解 XFEL 結晶構造解析：機能部位間の相互作用ダイナミクスの観測
Time-resolved XFEL crystallography of cytochrome *c* oxidase: Probing the interaction dynamics between two functional sites
○久保 稔（理研・播磨）
Minoru Kubo (*RIKEN SPring-8 Center*)

16:30～19:30　F 会場（中会議室 406）／Room F (Conference Room 406)

1SFP　細胞膜ナノ・メゾドメイン構造によるシグナル伝達の動的な制御機構
Unraveling the regulation mechanisms of signal transduction in nano- and meso-scale domains in cell membranes

オーガナイザー：森垣 憲一（神戸大学），鈴木 健一（京都大学）
Organizers: Kenichi Morigaki (Kobe University), Kenichi Suzuki (Kyoto University)

Membrane domains play critical roles in the cellular signal transduction. Recent studies on receptor oligomerization and lipid rafts have suggested that dynamic aggregation of molecules in nano- and mesoscopic domains are regulating the signal transduction cascade. However, the regulation mechanisms remain elusive. The present symposium intends to give an overview of the current understanding by providing the most up-to-date views from recent studies using cellular membranes and model systems to gain insight for the future directions.

オープニング
鈴木 健一
Kenichi Suzuki

1SFP-01　生細胞膜上で形成される G タンパク質共役型受容体の動的ダイマー：1 分子観察法を用いたアプローチ
Dynamic dimer formation of G-protein coupled receptor in the live plasma membrane: An approach by using single molecule observation
○笠井 倫志[1], 楠見 明弘[1,2]（[1]京大再生研, [2]沖縄科技大院）
Rinshi Kasai[1], Akihiro Kusumi[1,2] ([1]*Inst. Front. Med. Sci., Kyoto Univ.*, [2]*Membrane Cooperativity Unit, OIST*)

1SFP-02　細胞膜の分子組織構造・反応カップリング
Coupling of reactions and molecular organizations in plasma membranes
○貝塚 芳久（物質・材料研究機構）
Yoshihisa Kaizuka (*NIMS*)

1SFP-03　Cytokine receptor dimerization: molecular determinants and cellular regulation
Jacob Piehler (*University of Osnabrueck*)

1SFP-04　マイクロクラスターは T 細胞受容体のエンドサイトーシスのシグナルユニットとして機能する
Microclusters as a signaling unit for T cell receptor endocytosis
○横須賀 忠（東京医大・免疫学）
Tadashi Yokosuka (*Dept. Immunol., Tokyo Medical Univ.*)

1SFP-05　BAR タンパク質による細胞膜の形態形成とファゴサイトーシスの関連
Plasma membrane morphogenesis by the BAR domain superfamily proteins for phagocytic cup formation
○末次 志郎（奈良先端科学技術大学院大学）
Shiro Suetsugu (*NAIST*)

1SFP-06　視細胞円板膜上のロドプシン多量体クラスターがつくる一過的メゾ領域
Transient meso-domains formed by oligomeric clusters of rhodopsin in retinal disk membrane
○林 文夫[1], 齋藤 夏美[1], 谷本 泰士[2], 森垣 憲一[2,3], 妹尾 圭司[4]（[1]神戸大･院理, [2]神戸大・院農, [3]神戸大・バイオ, [4]浜松医大）
Fumio Hayashi[1], Natsumi Saito[1], Yasushi Tanimoto[2], Kenich Morigaki[2,3], Keiji Seno[4] ([1]*Grad. Sch. Sci. Kobe Univ.*, [2]*Grad. Sch. Agri. Kobe Univ.*, [3]*Biosig. Res. Cent. Kobe Univ.*, [4]*Hamamatsu Univ. Med.*)

クロージング
森垣 憲一
Kenichi Morigaki

16:30〜19:00　G 会場（小会議室 405）／Room G (Conference Room 405)

1SGP　「複雑生命システム動態研究教育拠点」共催

可塑性とロバストネスの動的状態論

Dynamic state theory for plasticity and robustness of biological systems

オーガナイザー：金子 邦彦（東京大学），古澤 力（理化学研究所）

Organizers: Kunihiko Kaneko (The University of Tokyo), Chikara Furusawa (RIKEN)

Biological systems exhibit robustness to various perturbations, including expression noise and environmental/genetic changes, while they are plastic to the surrounding environment, changing their state through processes like adaptation, evolution, and cell differentiation. Although the coexistence of robustness and plasticity can be understood as a dynamic property of biological systems, the mechanisms responsible for it are largely unknown. In this symposium, we will discuss how we can understand robustness and plasticity of biological systems based on both experimental and theoretical analysis.

1SGP-01　マイクロチャンバーと融合した大腸菌の生存

E. coli survival in inorganic chamber

○田端 和仁[1,2,3], 森泉 芳樹[1], 渡邊 力也[1], 芦川 裕樹[1], 野地 博行[1,3]（[1]東大院・工, [2]さきがけ・JST, [3]ImPACT・内閣府）

Kazuhito Tabata[1,2,3], Yoshiki Moriizumi[1], Rikiya Watanabe[1], Hiroki Ashikawa[1], Hiroyuki Noji[1,3] ([1]*Grad. sch. eng., Univ. of Tokyo*, [2]*PREST JST*, [3]*ImPACT Cabinet Office*)

1SGP-02　1 細胞レベルでの薬剤耐性獲得プロセス

Acquisition of drug resistance at the single-cell level

○若本 祐一（東大 院総合文化）

Yuichi Wakamoto (*Univ. of Tokyo*)

1SGP-03　Plasticity of developmental process that determines floral organ number

Miho Kitazawa[1,2], Koichi Fujimoto[2] ([1]*CELAS, Osaka Univ.*, [2]*Dept. Biol. Sci, Osaka Univ.*)

1SGP-04　生物システムの可塑性の理解に向けて：理論解析と実験進化

Toward Understanding of Biological Plasticity: Computational and Experimental analysis

○古澤 力[1,2]（[1]理研・生命システム, [2]東大・院理学）

Chikara Furusawa[1,2] ([1]*QBiC, RIKEN*, [2]*Grad. Sci., Univ. Tokyo*)

1SGP-05　表現型適応と進化のマクロ現象論：揺動応答関係、遺伝的同化、スローマニフォルド仮説

Macroscopic Theory of Phenotypic Adaptation and Evolution: Fluctuation-response, Genetic Assimilation, and Slow-Manifold Hypothesis

○金子 邦彦（東京大学）

Kunihiko Kaneko (*University of Tokyo*)

第 2 日目（11 月 26 日（土））／Day 2（Nov. 26 Sat.）

9:00〜11:30　A 会場（中ホール 200）／Room A (Convention Hall 200)

2SAA　光遺伝学で活躍するタンパク質分子の生物物理学研究の展望

Perspective in biophysical studies on protein molecules applicable for optogenetics

オーガナイザー：古谷 祐詞（自然科学研究機構 分子科学研究所），須藤 雄気（岡山大学）

Organizers: Yuji Furutani (Institute for Molecular Science, National Institutes of Natural Sciences), Yuki Sudo (Okayama University)

Optogenetics, a technology for controlling cellular activity by light, has rapidly expanded over the past decade, paving the way for experiments that would have once seemed impossible. Prior to this new trend, light-receptive proteins utilized for optogenetics have been extensively investigated in a variety of research fields, leading to the elucidation of the molecular mechanisms of them, which enabled us rational designs of optogenetics tools. This symposium focuses on recent advances of light-receptive proteins and their applications for optogenetics. New directions of the optogenetics in biophysics will be discussed.

2SAA-01 光生物分野における新区分の立ち上げ
Launching a new category in photobiology
○古谷 祐詞[1], 須藤 雄気[2]（[1]自然科学研究機構・分子研, [2]岡山大・院医歯薬）
Yuji Furutani[1], Yuki Sudo[2] ([1]*Inst. Mol. Sci, Nat. Inst. Nat. Sci.*, [2]*Grad. Sch. Med. Dent. Pharm. Sci., Okayama Univ.*)

2SAA-02 オプトジェネティクス革命
Optogenetic revolution
○八尾 寛[1,2]（[1]東北大学大学院生命科学研究科, [2]東北大学医学系研究科脳コアセンター）
Hiromu Yawo[1,2] ([1]*Tohoku University Graduate School of Life Sciences*, [2]*Center for Neuroscience, Tohoku University Graduate School of Medicine*)

2SAA-03 新規オプトジェネティクスツール探索：天然および人工の微生物型ロドプシン
Exploration of new optogenetic tools: natural and artificial microbial rhodopsins
○井上 圭一[1,2]（[1]名工大・院工, [2]JST・さきがけ）
Keiichi Inoue[1,2] ([1]*Grad. Sch. Eng., Nagoya Inst. Tech.*, [2]*JST PRESTO*)

2SAA-04 レチナールタンパク質を基盤とした光遺伝学ツールの開発に向けて
Towards production of retinal protein-based optogenetic tools
○須藤 雄気（岡山大学大学院医歯薬学総合研究科（薬学系））
Yuki Sudo (*Div. Pharm. Sci., Okayama Univ.*)

2SAA-05 Genetic, biochemical and biophysical studies on flavoprotein photoreceptors applicable for optogenetics
Shinji Masuda (*Center for Biological Resources & Informatics, Tokyo Institute of Technology*)

2SAA-06 Optogenetic potentials of bistable animal opsin-based pigments for regulating GPCR signalings
Mitsumasa Koyanagi[1,2,3] ([1]*Grad. Sch. Sci., Osaka City Univ.*, [2]*OCARINA, Osaka City Univ.*, [3]*JST PRESTO*)

2SAA-07 生体光操作技術の進展
Technological advances for optical control of living organisms
○七田 芳則（京大・院理・生物物理）
Yoshinori Shichida (*Dept. of Biophys., Grad. School of Sci., Kyoto Univ.*)

9:00～11:30　B 会場（中会議室 202）／Room B (Conference Room 202)

2SBA　構成的生物学の手法による生体分子，分子複合体，分子ネットワークの理解
Synthetic biology approaches to understand biological molecules, complexes, and networks

オーガナイザー：古田 健也（情報通信研究機構 未来 ICT 研究所），多田隈 尚史（京都大学）
Organizers: Ken'ya Furuta (Advanced ICT Research Institute, NICT), Hisashi Tadakuma (Kyoto University)

Synthetic biology approach has opened the new era of biology and biophysics. In this symposium, to unveil the secret of life phenomena, we focus on the de novo design of artificial molecules, complexes and networks: from redesign of enzymes to reconstitution of intracellular transport systems.

Introduction
古田 健也
Ken'ya Furuta

2SBA-01 Design of Nucleotide Binding Site Toward Controlling and Understanding Molecular Motor
Takahiro Kosugi (*Institute for Molecular Science*)

2SBA-02 タンパク質分子ブロックを用いた分子モーターのエンジニアリング
Engineering approaches to molecular motors based on protein building blocks
○古田 健也（（国研）NICT）
Ken'ya Furuta (*NICT*)

2SBA-03 Beyond DNA and RNA: synthetic genetic polymers
Alexander I. Taylor, Philipp Holliger (*MRC Laboratory of Molecular Biology*)

2SBA-04 Construction of DNA origami base gene transcription nano chip
Hisashi Tadakuma (*Kyoto Univ, iCeMS*)

2SBA-05 アクトミオシン細胞骨格の in vitro 再構成
In vitro reconstitution of contractile actomyosin cytoskeleton
○宮崎 牧人[1,2], 石渡 信一[1]（[1]早大・物理, [2]早大・WABIOS）
Makito Miyazaki[1,2], Shin'ichi Ishiwata[1] ([1]*Dept. Physics, Waseda Univ.*, [2]*WABIOS, Waseda Univ.*)

2SBA-06 Biomolecular Motors: From Cellular Function to Nanotechnological Applications
Stefan Diez (*B CUBE, TU Dresden, Germany*)

9:00〜11:30　C 会場（中会議室 201）／Room C (Conference Room 201)
2SCA　［学会本部企画 II］日本ー韓国交流シンポジウム：1 分子生物物理学の最前線
[BSJ Special Event II] Korea-Japan Joint Symposium: Frontiers of Single Molecule Biophysics

オーガナイザー：尹 兌榮（延世大學），榎 佐和子（東京大学）
Organizers: Tae-Young Yoon (Yonsei University), Sawako Enoki (The University of Tokyo)

Single molecule imaging and manipulation techniques are powerful tools to explore many biological phenomena. They are used to reveal the biological function, mechanics, intermolecular interactions, and dynamics of proteins and nucleic acids at single molecule level. Recently, the field of single molecule biophysics has heralded spectacular technical breakthroughs such as improvement of both spatial and temporal resolution, and development of optics for investigating complicated biological processes in living cells. This symposium provides a forum for world leading Korean and Japanese scientists to share recent advances in field of single molecule biophysics, and discuss future applications in both academic and medical settings.

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opening remarks
尹 兌榮
Tae-Young Yoon

2SCA-01 ZMW 法による生命現象の可視化の展開
Expansion of biological applications using Zero-Mode Waveguides
○上村 想太郎（東京大学大学院理学系研究科生物科学専攻）
Sotaro Uemura (*Dept. of Biol. Sci., Grad. Sch. of Sci., The Univ. of Tokyo*)

2SCA-02 Observation of single membrane proteins under mechanical tension
Tae-Young Yoon (*Yonsei University*)

2SCA-03 High-speed angle-resolved imaging of catalytic subunit of F1-ATPase
Sawako Enoki[1], Ryota Iino[2], Yoshihiro Minagawa[1], Yamato Niitani[3], Michio Tomishige[3], Hiroyuki Noji[1] ([1]*Dept. Appl. Chem, Grad. Sch. Eng. Univ. of Tokyo*, [2]*Okazaki Inst. Integ. BioSci., NINS*, [3]*Dept. Appl. Phys, Grad. Sch. Eng. Univ. of Tokyo*)

2SCA-04 Stochastic Regulation of DNA Mismatch Repair
Jong-Bong Lee (*Dept. of Physics, POSTECH*)

2SCA-05 細胞内一分子計測で探るキネシンの制御機構
Dissecting kinesin regulation through single molecule in cellulo measurements
○岡田 康志[1,2]（[1]理研 生命システム研究センター, [2]東大・理・物理）
Yasushi Okada[1,2] ([1]*QBiC, RIKEN*, [2]*Dept. Phys., Grad. Sch. Sci., Univ. Tokyo*)

2SCA-06 Propagation of gene expression noise by RNA polymerase in living cells
Nam Ki Lee (*Dept. of Physics, POSTECH*)

closing remarks
榎 佐和子
Sawako Enoki

9:00～11:30　D 会場（中ホール 300）／Room D (Convention Hall 300)

2SDA　新学術領域研究「温度を基軸とした生命現象の統合的理解」共催
温度生物学の挑戦
The Developing Field of Thermal Biology

オーガナイザー：岡部 弘基（東京大学），原田 慶恵（大阪大学）
Organizers: Kohki Okabe (The University of Tokyo), Yoshie Harada (Osaka University)

Temperature, a key regulator of biochemical reactions, influences important physiological functions. Recently intracellular thermometry has revealed that there are significant temperature changes at the single cell level related directly to cellular events, which encouraged a novel field of biology focused solely on temperature, thermal biology, to emerge. This symposium will provide an overview of the latest developments in the field of thermal biology, revealing the relationship between temperature and life activities, and will explore how this fundamental physical parameter contributes to all molecular-based biologies.

はじめに
岡部 弘基
Kohki Okabe

2SDA-01　細胞生物学のためのオンチップ高感度熱量センサ
On-chip high sensitive thermal sensors for cell biology
○小野 崇人, 猪股 直生（東北大学）
Takahito Ono, Naoki Inomata (*Tohoku University*)

2SDA-02　蛍光センサーを利用した一細胞温度計測からわかること
What we see in single-cell thermometry by using fluorescent sensors
○鈴木 団[1,2]（[1]早大・WABIOS, [2]JSTさきがけ）
Madoka Suzuki[1,2] ([1]*WASEDA Biosci. Res. Inst. Singapore (WABIOS), Waseda Univ.*, [2]*JST, PRESTO*)

2SDA-03　様々な生物種の温度測定に利用でき且つ速い温度変化を測定可能な蛍光性温度プローブタンパク質
Genetically encoded ratiometric fluorescent thermometer with wide temperature range and rapid response
○中野 雅裕[1], 新井 由之[1], 小寺 一平[2], 岡部 弘基[3,4], 亀井 保博[5], 永井 健治[1]（[1]阪大・産研, [2]北大・電子研, [3]東大院・薬学系研究科, [4]JST, さきがけ, [5]基生研）
Masahiro Nakano[1], Yoshiyuki Arai[1], Ippei Kotera[2], Kohki Okabe[3,4], Yasuhiro Kamei[5], Takeharu Nagai[1] ([1]*ISIR, Osaka Univ.*, [2]*RIES, Hokkaido Univ.*, [3]*Grad. Sch. Pharma., Univ. Tokyo*, [4]*JST, PRESTO*, [5]*NIBB*)

2SDA-04　機能性磁性ナノ粒子を用いたガン温熱療法
Hyperthermia using functional magnetite nanoparticles
○井藤 彰（九大・工・化工）
Akira Ito (*Dept. of Chem. Eng., Fac. of Eng., Kyushu Univ.*)

2SDA-05　人工再構成系を用いた温度感受性 TRP チャネルの機能解析
Single channel analysis of the thermosensitive TRP channels in bilayer lipid membrane
○内田 邦敏[1,2,3], Zakharian Eleonora[2], 富永 真琴[3], 山崎 純[1]（[1]福岡歯科大学, [2]イリノイ大学医学部, [3]生理学研究所）
Kunitoshi Uchida[1,2,3], Eleonora Zakharian[2], Makoto Tominaga[3], Jun Yamazaki[1] ([1]*Fukuoka Dent. Coll.*, [2]*Univ. of Illinois Coll. of Med.*, [3]*NIPS*)

2SDA-06　外温性および内温性動物の脳の発生と進化
Brain development and evolution of ectothermal and endothermal animals
○野村 真（京都府立医科大学生物学教室）
Tadashi Nomura (*Dept. Biol. Kyoto Pref. Univ. Med.*)

9:00〜11:30　E 会場（小会議室 303）／Room E (Conference Room 303)

2SEA　生命現象の理解を目指した立体構造インフォマティクスデータの活用
Applications of protein structure data for understanding biological phenomenon

オーガナイザー：内古閑 伸之（中央大学），根本 航（東京電機大学）
Organizers: Nobuyuki Uchikoga (Chuo University), Wataru Nemoto (Tokyo Denki University)

Recently, huge amounts of various biological data are generated by various new technologies and available to biological researches for obtaining new biophysical views. For more understanding biology with increasing biological data, it is necessary to develop bioinformatic methods.
In this symposium, we introduce biological and bioinformatic studies mainly with protein structures, which can be some clue for deep understanding of biology.

2SEA-01　剛体ドッキングによるタンパク質間相互作用表面のプロファイル解析
Profile analysis of protein interaction surface with rigid-body docking decoys
○内古閑 伸之（中央大学 理工学部 物理学科）
Nobuyuki Uchikoga (*Dept. of Physics, Chuo Univ.*)

2SEA-02　マウスはやはりヒト炎症性疾患のモデルになる ーバイオインフォマティクス的手法によるマウスモデルの再評価ー
Genomic responses in mouse models greatly mimic human inflammatory diseases
○高雄 啓三[1,2,3]（[1]富山大・生命科学先端研究支援ユニット, [2]富山大院・医学薬学, [3]生理学研究所）
Keizo Takao[1,2,3] ([1]*Life Sci. Res. Ctr., Univ. Toyama*, [2]*Grad. Sch. Med. Pharm., Univ. Toyama*, [3]*NIPS*)

2SEA-03　Development of an Efficient Amino Acid Substitution Matrix: MIQS
Kentaro Tomii[1], Kazunori Yamada[1, 2] ([1]*AIST*, [2]*Tohoku University*)

2SEA-04　ドッキングモデル構造群を用いたタンパク質間相互作用予測
Rigid docking based protein-protein interaction prediction by using high scoring docking models
○松崎 由理（東工大・情生院）
Yuri Matsuzaki (*ACLS, Tokyo Tech.*)

2SEA-05　An index to collect homologous sequences with the same or similar biochemical functions
Wataru Nemoto[1], Shoichiro Kato[1], Hiroyuki Toh[2] ([1]*Div. of Life Sci. & Eng., Sch of Sci & Eng., Tokyo Denki Univ.*, [2]*Dep. of Biomed. Chem., Sch. of Sci. & Tec., Kwansei Gakuin Univ.*)

9:00〜11:30　F 会場（中会議室 406）／Room F (Conference Room 406)

2SFA　免疫学と生物物理の接点
Physical Immunology

オーガナイザー：小林 徹也（東京大学），秋山 泰身（東京大学）
Organizers: Tetsuya J. Kobayashi (The University of Tokyo), Taishin Akiyama (The University of Tokyo)

Adaptive immunity is a highly evolved adaptive system in which fundamental biophysical processes such as molecular recognitions, chemotaxis, and collective responses play the crucial roles. Immunological system is, therefore, a good target to address the question how a complex adaptive system emerges out of the combinations of basic biophysical processes. In this symposium, we clarify the physical aspects of immunology, and discuss the potential contributions of biophysics and quantitative biology to the problems in immunology.

2SFA-01　Physical & quantitative aspects of immunology
Tetsuya J. Kobayashi[1,2], Taishin Akiyama[3] ([1]*IIS, Univ. Tokyo*, [2]*JST PRESTO*, [3]*Institute of Medical Science, The University of Tokyo*)

2SFA-02　Ｔ細胞活性化の一細胞分子イメージング
Single cell molecular imaging for T cell activation
○斉藤 隆[1,2]（[1]理研・IMS, [2]阪大 IFReC）
Takashi Saito[1,2] ([1]*RIKEN-IMS*, [2]*IFReC Osaka Univ.*)

2SFA-03 Application of stochastic models in quantitative immunology
Shunsuke Teraguchi, Yutaro Kumagai (*IFReC, Osaka Univ.*)

2SFA-04 動的な誘引場に対する免疫細胞の走化性に見られる共通性と特異性
Generality and specificity in chemotaxis response of immune cells in dynamic gradients of chemoattractant
○中島 昭彦[1], 石田 元彦[2], 澤井 哲[1,2]（[1]東大・院総文・複雑生命, [2]東大・院総文・広域科学）
Akihiko Nakajima[1], Motohiko Ishida[2], Satoshi Sawai[1,2] ([1]*Res. Cent. Comp. Sys. Biol., Grad. Sch. Arts Sci., Univ. Tokyo*, [2]*Dept. Basic Sci., Grad. Sch. Arts Sci., Univ. Tokyo*)

2SFA-05 適応免疫応答を調節するリンパ節内の細胞ダイナミクス
Cellular dynamics shaping adaptive immune responses in the lymph node
○岡田 峰陽[1,2,3]（[1]理化学研究所 統合生命医科学研究センター, [2]科学技術振興機構さきがけ, [3]横浜市立大学大学院生命医科学研究科）
Takaharu Okada[1,2,3] ([1]*RIKEN Center for Integrative Medical Sciences*, [2]*PRESTO, Japan Science and Technology Agency*, [3]*Graduate School of Medical Life Science, Yokohama City Univ.*)

2SFA-06 Quantitative analysis of T cell repertoire and homeostasis
Taishin Akiyama[1], Tetsuya J. Kobayashi[2] ([1]*Institute of Medical Science, The University of Tokyo*, [2]*Institute of Industrial Science, The University of Tokyo*)

9:00〜11:30　G 会場（小会議室 405）／Room G (Conference Room 405)

2SGA　電子顕微鏡が捉える生物アーキテクチャの解明ー高分解能化と多様な情報の融合ー
Biological architecture elucidated by electron micrroscopy - Integration of highly-resolved strucutre and other various information -

オーガナイザー：安永 卓生（九州工業大学）, 岩崎 憲治（大阪大学）
Organizers: Takuo Yasunaga (Kyushu Institute of Technology), Kenji Iwasaki (Osaka University)

Recent progress of electron microscopy (EM) provides us a new era when we observe protein structure at a near atomic resolution and protein architecture in situ, such as in lipid bilayers, cellar organelles, cells, tissues and so on. Also, other imaging techniques as light microscopy and atomic force microscopy can be integrated with EM to elucidate organic architecture under physiological conditions. Here we introduce cutting-edge observations and discuss further potentials of EM.

2SGA-01 脂質二分子膜を隔てた情報変換をとらえるクライオ電子顕微鏡単粒子解析法
Single particle cryoEM to elucidate signal transduction through lipiid bilayer membrane
○重松 秀樹[1,2,3]（[1]理研CLST, [2]横浜市大院・生命医科学, [3]エール大・医）
Hideki Shigematsu[1,2,3] ([1]*RIKEN CLST*, [2]*Med. Life Sci., Yokohama City University*, [3]*Yale Univ. Sch. Med.*)

2SGA-02 極低温電子顕微鏡構造に基づいた胃プロトンポンプ―胃酸抑制剤結合モデル
Binding model of the acid suppressant to the gastric proton pump based on cryo-EM structure
○阿部 一啓[1,2]（[1]名大・細胞生理, [2]名大院・創薬）
Kazuhiro Abe[1,2] ([1]*Cellular and Structural Physiology Institute, Nagoya Univ.*, [2]*Grad. Sch. Pharm.*)

2SGA-03 電子顕微鏡を用いた繊毛の三次元構造解析
Three-dimensional electron microscopy of cilia
○小田 賢幸（山梨大・院医）
Toshiyuki Oda (*Grad. Sch. Med., Univ. Yamanashi*)

2SGA-04 CryoTEM のための CryoCLEM システムの最新アプリケーション
Latest application of CryoCLEM system for cryo-TEM
○石原 あゆみ[1], 荒牧 信二[2], 肥後 智也[2], 安永 卓生[2]（[1]ライカマイクロシステムズ株式会社, [2]九工大・院情報工・生命情報工）
Ayumi Ishihara[1], Shinji Aramaki[2], Tomoya Higo[2], Takuo Yasunaga[2] ([1]*Leica Microsystems K.K.*, [2]*Grad. Sch. Computer Sci. & Systems Eng., Kyushu Inst. of Tech.*)

2SGA-05 Correlative Atomic Force and Transmission Electron Microscopy
Katsuya Shimabukuro[1], Yutaro Yamada[1,2] ([1]*NIT, Ube College*, [2]*Dep. of Bio. Kanazawa Univ.*)

2SGA-06 Cryo-electron microscopy single particle analysis at near atomic resolution
Naoyuki Miyazaki, Kenji Iwasaki (*IPR, Osaka Univ.*)

16:15～18:45　A 会場（中ホール 200）／Room A (Convention Hall 200)
2SAP　新学術領域研究「共鳴誘導で革新するバイオイメージング」共催
生体分子ー電磁波間の共鳴を活用する最先端バイオイメージング
Advanced bioimaging utilizing resonance between electromagnetic waves and molecules for life

オーガナイザー：宮脇 敦史（理化学研究所），根本 知己（北海道大学）
Organizers: Atsushi Miyawaki (RIKEN), Tomomi Nemoto (Hokkaido University)

For the elucidation of biological emergent functions, multidimensional information is required to be investigated at each level of molecule, cell or organ by using optical imaging or optical manipulations. Recently, several epoch-making methodologies for such visualizations and manipulations have been proposed based on advanced light and laser technologies. Here, we serve an opportunity for "resonant" interactions among researchers controlling electromagnetic waves and ones controlling molecules, hoping that it will produce dramatic breakthroughs and broad-ranging discussions on their potentials for life sciences.

2SAP-01 Cruising inside cells
Atsushi Miyawaki[1,2] ([1]*RIKEN BSI*, [2]*RIKEN RAP*)

2SAP-02 NIR II/III (OTN-NIR)におけるバイオイメージング ー透明性を求めてー
Bioimaging in NIR II/III (OTN-NIR) seeking for transparency
○曽我 公平[1,2], 上村 真生[1,2]（[1]東理大・基礎工・材料工, [2]東理大・総研院・IFC）
Kohei Soga[1,2], Masao Kamimura[1,2] ([1]*Dept. Mater. Sci. & Tech., Tokyo Univ. of Sci.*, [2]*IFC, Tokyo Univ. of Sci.*)

2SAP-03 半導体レーザー高機能パルス光源による多光子イメージング
Advanced semiconductor-laser optical pulse sources for multiphoton microscopy
○横山 弘之（東北大学未来科学技術共同研究センター）
Hiroyuki Yokoyama (*New Industry Creation Hatchery Center (NICHe), Univ. Tohoku*)

2SAP-04 ベクトルビームを用いた共焦点顕微鏡法における分解能向上
Resolution enhancement in confocal microscopy with vector beams
○佐藤 俊一, 小澤 祐市（東北大・多元研）
Shunichi Sato, Yuichi Kozawa (*IMRAM, Tohoku Univ.*)

2SAP-05 白色レーザーによるコヒーレント非線形光学イメージング
Coherent nonlinear optical imaging using a white-ligtht laser source
○加納 英明（筑波大学・数理物質）
Hideaki Kano (*Inst. of Applied Physics, Univ. of Tsukuba*)

2SAP-06 光シート顕微鏡の改良と発生生物学への応用
Light-sheet microscopy: technical development and application for developmental biology
○野中 茂紀（基生研）
Shigenori Nonaka (*National Inst. for Basic Biol.*)

16:15〜19:05　B 会場（中会議室 202）／Room B (Conference Room 202)
2SBP　ラマン散乱で探る bio. phys. chem. 三重点
Bio-Raman research seeking bio. phys. chem. about the triple point

オーガナイザー：盛田 伸一（東北大学），星野 由美（広島大学）
Organizers: Shin-ichi Morita (Tohoku University), Yumi Hoshino (Hiroshima University)

Raman microscope studies on live cells have attracted many researchers these past several years, providing cutting-edge applications, for instance, marking small molecules using alkyne based tags, estimating internal states of single cells, and observing tissues and small animals in a direct manner. Here, in this symposium, synthetic chemists and bio-physicists meet and discuss to find upcoming directions of bio-Raman research. The symposium therefore targets researchers who are interested in bio-Raman research not only the experts.

2SBP-01　ラマン分光等イメージング技術で紐解く生命現象と情報伝達過程
Bio-imaging without staining: Raman imaging and others
○岡 浩太郎（慶應大・理工・生命情報）
Kotaro Oka (*Dep. Biosci. & Infor., Keio Univ.*)

2SBP-02　細胞分化のバイオ・ラマン研究： 中間状態の検出
Bio-Raman Research on Cellular Differentiation to Detect the Reversible State
○盛田 伸一（東北大院理）
Shin-ichi Morita (*Tohoku Univ.*)

2SBP-03　蛍光プローブの精密設計による迅速癌検出
Rapid cancer imaging by rationally designed fluorescence probes
○神谷 真子[1,2], 浦野 泰照[1,3,4]（[1]東京大学大学院医学系研究科, [2]JST さきがけ, [3]東京大学大学院薬学系研究科, [4]AMED CREST）
Mako Kamiya[1,2], Yasuteru Urano[1,3,4] ([1]*Grad. Sch. of Med., Univ. of Tokyo*, [2]*JST PRESTO*, [3]*Grad. Sch. of Pharm. Sci, Univ. of Tokyo*, [4]*AMED CREST*)

2SBP-04　バイオラマン顕微鏡を用いた卵子のクオリティー評価
Oocyte evaluation using Bio-Raman microscope
○星野 由美（広島大学大学院生物圏科学研究科）
Yumi Hoshino (*Hiroshima University*)

2SBP-05　二本鎖 RNA オーバーハング構造結合選択性を有する合成蛍光プローブの開発と RNA 干渉研究への応用
Synthetic fluorescent probes capable of selective binding to 3’-overhanging structures in double-stranded RNAs for RNA interference study
○佐藤 雄介（東北大学大学院理学研究科化学専攻）
Yusuke Sato (*Department of Chemistry, Graduate School of Science, Tohoku University*)

2SBP-06　細胞膜分子動態が語る細胞の個性
What membrane molecule dynamics tell us about the cell
○坂内 博子[1,2], 丹羽 史尋[2,3], 有薗 美沙[2,4], 御子柴 克彦[2]（[1]JST・さきがけ・1 細胞, [2]理研・脳センター, [3]パリ高等師範学校生物学研究所, INSERM, [4]ボルドー大学）
Hiroko Bannai[1,2], Fumihiro Niwa[2,3], Misa Arizono[2,4], Katsuhiko Mikoshiba[2] ([1]*JST PRESTO*, [2]*RIKEN BSI*, [3]*IBENS, INSERM*, [4]*Univ. of Bordeaux*)

16:15〜18:45　C 会場（中会議室 201）／Room C (Conference Room 201)
2SCP　［学会本部企画 III］日本ーオーストラリア交流シンポジウム：ライブセルイメージング
[BSJ Special Event III] BSJ-ASB Joint Symposium: Live Cell Imaging

オーガナイザー：林 久美子（東北大学），高橋 聡（東北大学）
Organizers: Kumiko Hayashi (Tohoku University), Satoshi Takahashi (Tohoku University)

We have this symposium on live cell imaging for the purpose of exchanges between Australian Society for Biophysics (ASB) and Biophysical Society of Japan (BSJ). Cutting-edge researches on fluorescence correlation spectroscopy and fluorescence probes to measure biochemical quantities in cells such as pH, ATP concentration and temperature are introduced. Structure analysis of cells using XFEL (X-ray Free Electron Laser) is also included as a new topic on live cell imaging.

2SCP-01　線虫胚における細胞質流動のイメージングとモデリング
Imaging and modeling of cytoplasmic streaming in the *C. elegans* embryo
○木村 暁[1,2]（[1]遺伝研・細胞建築, [2]総研大・遺伝学）
Akatsuki Kimura[1,2] ([1]*Cell Arch. Lab., Nat. Inst. Genet.*, [2]*Dept. Genet., SOKENDAI*)

2SCP-02　Profilin-1 membrane dynamics in live cells
Pierre Moens (*Univ. of New England*)

2SCP-03　細胞機能に関わる細胞内 pH の計測
Fluorescence imaging of cytoplasmic pH associated with cellular functions
○森本 雄祐[1], 上田 昌宏[1,2]（[1]理研・生命システム, [2]阪大・院生命機能）
Yusuke V. Morimoto[1], Masahiro Ueda[1,2] ([1]*QBiC, RIKEN*, [2]*Grad. Sch. Frontier Biosci., Osaka Univ.*)

2SCP-04　Pair correlation microscopy reveals nanoparticle shape to control intracellular transport
Elizabeth Hinde (*Univ. of New South Wales*)

2SCP-05　Fluidic microenvironment in live cells revealed by standard molecules and nanoparticles
Chan-Gi Pack[1], Min-Kyo Jung[1], Sung-Sik Han[2] ([1]*University of Ulsan College of Medicine & AMC*, [2]*Korea University*)

2SCP-06　RGB カラーの蛍光タンパク質センサーによる細胞内 ATP の時空間イメージングと定量解析
Spatiotemporal imaging and quantitative analysis of subcellular ATP using RGB-colorful fluorescent protein based indicators
○新井 敏[1], 伊藤 秀城[2], Sudhaharan Thankiah[2], Lane E. Birgitte[2], 北口 哲也[1]（[1]早大・WABIOS, [2]IMB, A*STAR, Singapore）
Satoshi Arai[1], Hideki Ito[2], Thankiah Sudhaharan[2], E. Birgitte Lane[2], Tetsuya Kitaguchi[1] ([1]*WASEDA Biosci. Res. Inst. Singapore (WABIOS), Waseda Univ.*, [2]*Inst. of Med. Biol. (IMB), A*STAR, Singapore*)

2SCP-07　X 線レーザーによる生きた細胞のナノイメージング
Imaging live cell at the nanoscale by X-ray laser diffraction
○城地 保昌[1,2]（[1]JASRI, [2]理研RSC）
Yasumasa Joti[1,2] ([1]*JASRI*, [2]*RIKEN SPring-8 center*)

16:15〜19:05　D 会場（中ホール 300）／Room D (Convention Hall 300)
2SDP　蛋白質の秩序化−脱秩序化研究の最前線
Frontiers in protein organization and disorganization

オーガナイザー：伊野部 智由（富山大学），濵田 大三（神戸大学）
Organizers: Tomonao Inobe (University of Toyama), Daizo Hamada (Kobe University)

“Why and how the proteins can fold into well-ordered structures?” have been one of the most important questions in biology. Recent analysis has clarified that this complex process is also coupled with a variety of biological phenomena including protein translation, amyloid formation and degradation as well as protein-protein interactions. In this symposium, we recategorised these into “Protein Organization / Disorganization Problems” and will discuss future perspectives.

はじめに
濵田 大三
Daizo Hamada

2SDP-01 マイクロ秒分解一分子蛍光測定でみる変性タンパク質のダイナミクスとタンパク質折り畳み転移
Microsecond tracking of unfolded protein dynamics and protein folding transitions by single-molecule fluorescence spectroscopy
○小井川 浩之（東北大 多元研）
Hiroyuki Oikawa (*IMRAM, Tohoku Univ.*)

2SDP-02 タンパク質凝集体の表面から突出したポリペプチド鎖は分子シャペロンによる脱凝集効率に影響を与える
Polypeptides protruded from the surface of protein aggregation influence the efficiency of disaggregation by molecular chaperones
○渡辺 洋平[1,2], 山崎 孝史[1], 野島 達也[3], 小田 彰克[1]（[1]甲南大・理工・生物, [2]甲南大・統合ニューロ, [3]東工大・IIR）
Yo-hei Watanabe[1,2], Takashi Yamasaki[1], Tatsuya Nojima[3], Akiyoshi Oda[1] ([1]*Dept. Biol., Facult. Sci. Eng., Konan Univ.*, [2]*Inst. Integrated Neurobiol., Konan Univ.*, [3]*IIR, Tokyo Tech.*)

2SDP-03 Integrated in vivo and in vitro nascent chain profiling reveals widespread translational pausing
Yuhei Chadani[1,2], Tatsuya Niwa[1], Shinobu Chiba[2], Hideki Taguchi[1], Koreaki Ito[2] ([1]*Inst. of Innovative Research, Tokyo Inst. of Tech.*, [2]*Fac. of Life Sci., Kyoto Sangyo Univ.*)

2SDP-04 天然タンパク質の分子サイズに関する統計解析
Statistical analysis on the molecular size of native proteins
○河合 秀信, 高橋 大輔, 新井 宗仁（東大・総合文化・生命環境）
Hidenobu Kawai, Daisuke Takahashi, Munehito Arai (*Dept. Life Sci., Univ. Tokyo*)

2SDP-05 ユビキチン化に伴う蛋白質の凝集体形成
Ubiquitylation-induced protein aggregation
○森本 大智[1], ヴァリンダ エリック[2], 深田 はるみ[3], 菅瀬 謙治[1], 星野 大[4], 藤井 高志[5], 難波 啓一[6], 小松 雅明[7], 田中 啓二[8], 白川 昌宏[1]（[1]京大・工, [2]京大・医, [3]大府大・生命環境, [4]京大・薬, [5]理研・QBiC, [6]阪大・生命機能, [7]新潟大・医, [8]東京都医学研・蛋白質代謝）
Daichi Morimoto[1], Erik Walinda[2], Harumi Fukada[3], Kenji Sugase[1], Masaru Hoshino[4], Takashi Fujii[5], Keiichi Namba[6], Masaaki Komatsu[7], Keiji Tanaka[8], Masahiro Shirakawa[1] ([1]*Eng., Kyoto Uni.*, [2]*Med., Kyoto Uni.*, [3]*Life Envi. Sci., Osaka Pref. Uni.*, [4]*Pharm., Kyoto Uni.*, [5]*Frontier Biosci., Osaka Uni.*, [6]*Frontier Biosci., Osaka Uni.*, [7]*Med., Niigata Uni.*, [8]*Lab. Protein Metabolism, Tokyo Metro. Ins. Med. Sci.*)

2SDP-06 分子シャペロンによるプロテアソームタンパク質分解の制御
Regulation of proteasomal degradation by molecular chaperone
○伊野部 智由（富山大･工･生命工）
Tomonao Inobe (*Grad. Sch. Sci. and Eng., Univ. Toyama*)

総合討論
伊野部 智由
Tomonao Inobe

16:15～18:45　E 会場（小会議室 303）／Room E (Conference Room 303)
2SEP　新しい視点を創る光学顕微鏡技術
Taking a new look through the optical microscopy

オーガナイザー：加藤 薫（産業技術総合研究所），西山 雅祥（京都大学）
Organizers: Kaoru Katoh (AIST), Masayoshi Nishiyama (Kyoto University)

Optical microscopy is an important tool for imaging and measurement in life sciences. This session focus on technical topics that can be seeds of future key technologies. Detail of each technology should be explained and biophysical application will be shown in the presentation. This session will show possibilities of future life sciences from a standing point of imaging technologies.

2SEP-01 高圧力顕微鏡法で生きた細胞内で働く分子機械を操作する
High-pressure microscopy for controlling molecular machines in living cells
○西山 雅祥（京大白眉セ）
Masayoshi Nishiyama (*The HAKUBI Center, Kyoto Univ.*)

2SEP-02 生細胞内における生体分子動態マッピングに向けて
Researchs towards bio-molecular dynamics mapping in cell
○山本 条太郎（北大院先端生命）
Johtaro Yamamoto (*Faculty of Adv. Life Sci., Hokkaido Univ.*)

2SEP-03 絶対零度で蛍光 1 分子を見る
Fluorescence microscopy of single molecules at a few K.
○藤芳 暁（東京工業大学 理学院）
Satoru Fujiyoshi (*Tokyo Tech*)

2SEP-04 位相差法による無染色での試料の同定法の開発
Apodized phase contrast imaging for identification of specimens without staining
○大瀧 達朗[1,2]（[1]ニコン・コアテク, [2]東北大・院医工学）
Tatsuro Otaki[1,2] ([1]*Core Technology, Nikon Corp.*, [2]*Grad. Sch. Biomed. Eng., Tohoku Univ.*)

2SEP-05 光の波面を制御して散乱体を透視する
Seeing through scattering media by controlling wavefront of light
○白井 智宏, 加藤 薫（産業技術総合研究所）
Tomohiro Shirai, Kaoru Katoh (*AIST*)

2SEP-06 構成分子の位置および向きの 1 分子観察から読み解く分子会合のダイナミクス
Dissection of molecular assembly dynamics by tracking orientation and position of single molecules in live cells
○谷 知己（ウッズホール海洋生物学研究所）
Tomomi Tani (*Marine Biological Laboratory*)

16:15〜18:45　F 会場（中会議室 406）／Room F (Conference Room 406)

2SFP　新学術領域研究「スパースモデリングの深化と高次元データ駆動科学の創成」共催
データ駆動科学 （スパースモデリング）による計測の進展
Advances in experimental measurements by data-driven science based on sparse modeling

オーガナイザー：木川 隆則（理化学研究所），池谷 鉄兵（首都大学東京）
Organizers: Takanori Kigawa (RIKEN), Teppei Ikeya (Tokyo Metropolitan University)

Sparse modeling (SpM), which is a key technology in data-driven science, enables efficient extraction of the maximum amount of information from experimental measurements by exploiting the inherent sparseness that is common to all high-dimensional data. In this symposium, researchers who are achieving remarkable results by SpM will be presented in different research fields, information science, statistical mechanics, astronomy and structure biology. Clarifying the common principles that apply in the background of each case, the future perspectives of biomolecule measurements will be discussed.

Introduction
木川 隆則
Takanori Kigawa

2SFP-01 スパースモデリングとデータ駆動科学
Sparse modeling and date driven science
○岡田 真人（東大）
Masato Okada (*Univ. of Tokyo*)

2SFP-02 Recent development of Monte Carlo sampling techniques
Koji Hukushima (*Univ. of Tokyo*)

2SFP-03 Fourier imaging with sparse modeling: An application to black hole astronomy
Mareki Honma (*NAOJ Mizusawa*)

2SFP-04 ベイズ解析を用いるX線1分子観察
X-ray Single Molecule Observations using Bayesian Analysis
○佐々木 裕次（東京大学大学院 新領域創成科学研究科）
Yuji Sasaki (*Graduate School of Frontier Sciences, The University of Tokyo*)

2SFP-05 スパースNMRデータを用いた細胞内蛋白質立体構造決定
Protein NMR structure determination for sparse data set dervied from living cells
○池谷 鉄兵[1,2], 池田 思朗[3], 木川 隆則[4], 伊藤 隆[1,2], Guentert Peter[5]（[1]首都大院 理工, [2]CREST, JST, [3]統計数理研, [4]理研 生命システム研究センター, [5]フランクフルトゲーテ大学）
Teppei Ikeya[1,2], Shiro Ikeda[3], Takanori Kigawa[4], Yutaka Ito[1,2], Peter Guentert[5] ([1]*Tokyo Metropolitan University, Graduate School of Science and Engineering*, [2]*CREST, JST*, [3]*The Institute of Statistical Mathematics*, [4]*RIKEN, QBiC*, [5]*Goethe University Frankfurt am Main*)

16:15～18:45　G会場（小会議室405）／Room G (Conference Room 405)

2SGP　リン酸化ダイナミクスが支える生命情報処理機構
Information processing governed by dynamic protein phosphorylation

オーガナイザー：大出 晃士（東京大学），小川 覚之（東京大学）
Organizers: Koji L. Ode (The University of Tokyo), Tadayuki Ogawa (The University of Tokyo)

This symposium aims to foster a deeper understanding of the significance of reversible protein phosphorylation driven by kinases and phosphatases in the regulation of dynamic information processing in cells, including frequency control in central nerve systems, spatiotemporal regulation of cell structure, rhythmic response driven by molecular oscillator, and signal processing through kinase cascade. From a cross-cutting perspective, a unified property of reversible phosphorylation that governs nonlinear and complex cellular dynamics will be discussed.

2SGP-01 クリプトクロム蛋白質の柔軟なループ構造への多重リン酸化は哺乳類概日時計の周期長を相加的に制御する
Multiple phosphorylation at flexible loops of cryptochrome additively modulates the period of mammalian circadian clock
○大出 晃士[1,2], 上田 泰己[1,2]（[1]東大・院医・システムズ薬理, [2]理研・生命システム研究センター）
Koji L. Ode[1,2], Hiroki R. Ueda[1,2] ([1]*Dept. of Sys. Pharm., Grad. Sch. of Med., the Univ. of Tokyo*, [2]*QBiC, RIKEN*)

2SGP-02 リン酸化で規定されるタンパク質コンフォメーションから細胞の応答性を予測する
Signaling protein conformation regulated by multiple phosphorylations points in the direction of cell fate
○日比野 佳代[1,2,3]（[1]遺伝研, [2]総研大, [3]理研）
Kayo Hibino[1,2,3] ([1]*NIG*, [2]*SOKENDAI*, [3]*RIKEN*)

2SGP-03 CaMKIIα とカルシニューリンによる神経入力情報のデコーディングと表現
Nonlinear Decoding and Asymmetric Representation of Neuronal Input Information by CaMKIIα and Calcineurin
○藤井 哉, 井上 昌俊, 尾藤 晴彦（東京大学大学院医学系研究科）
Hajime Fujii, Masatoshi Inoue, Haruhiko Bito (*Department of Neurochemistry, Grad. Sch. of Medicine, The Univ. of Tokyo*)

2SGP-04 リン酸化アイソタイプの定量解析によるシナプスリン酸化シグナル伝達の新知見
Novel insight of synaptic phosphorylation signal transduction by quantitative analysis of phosphoisotypes
○細川 智永（理研・脳科学）
Tomohisa Hosokawa (*RIKEN BSI*)

2SGP-05 動的蛋白質リン酸化による生命現象の時間スケール調節
Dynamic protein phosphorylation as a time “scale” machine
○畠山 哲央（東京大学総合文化研究科）
Tetsuhiro S. Hatakeyama (*Department of Basic Science, The University of Tokyo*)

2SGP-06 微小管ダイナミクスを制御する異なる特異的リン酸化カスケード
Site-specific Phosphorylation Cascades that Differentially Regulate Microtubule Dynamics in Neuron
○小川 覚之, 廣川 信隆（東大・院医）
Tadayuki Ogawa, Nobutaka Hirokawa (*Grad. Sch. Med., Univ. Tokyo*)

第 3 日目（11 月 27 日（日））／Day 3（Nov. 27 Sun.）

9:45〜12:15　A 会場（中ホール 200）／Room A (Convention Hall 200)

3SAA　蛍光・発光計測技術が拓く細胞生物学の新地平

New fields of cell biology explored with fluorescence and bioluminescence techniques

オーガナイザー：今村 博臣（京都大学），小柴 琢己（九州大学）

Organizers: Hiromi Imamura (Kyoto University), Takumi Koshiba (Kyushu University)

Fluorescence techniques have played great roles in biological research. Especially, fluorescence imaging techniques have propelled cell biology research, and are still under rapid development. Recently, bioluminescence techniques also become important for cell biology. In this symposium, we will invite relatively young investigators who explore new fields of cell biology with fluorescence and bioluminescence techniques.

3SAA-01　Mitochondrial-mediated antiviral immunity and oxidative phosphorylation

Takumi Koshiba (*Dep of Biol., Fac. of Sci., Kyushu Univ.*)

3SAA-02　線虫の塩忌避学習による行動変化に関与する神経の同定及び神経回路の解析

Identification of neurons and analysis of the neuronal circuit involved in the learned salt-avoidance behavior in C. elegans

○張 文瑄[1,3], 豊島 有[1,3], 国友 博文[1,3], 金森 真奈美[1,3], 寺本 孝行[2,3], 石原 健[2,3], 飯野 雄一[1,3]（[1]東京大学大学院理学系研究科生物科学専攻, [2]九州大学大学院理研究院生物科学専攻, [3]CREST, JST）

MoonSun Jang[1,3], Yu Toyoshima[1,3], Hirofumi Kunitomo[1,3], Manami Kanamori[1,3], Takayuki Teramoto[2,3], Takeshi Ishihara[2,3], Yuichi Iino[1,3] ([1]*Department of Biological Sciences, Graduate School of Science, The University of Tokyo*, [2]*Department of Biology, Faculty of Science, Kyushu University*, [3]*CREST, Japan Science and Technology Agency*)

3SAA-03　蛍光イメージングで紐解くインフルエンザウイルス感染の分子基盤

The molecular basis of influenza virus infection unveiled by fluorescence imaging

○大場 雄介, 藤岡 容一朗, 西出 真也, 南保 明日香（北海道大学大学院医学研究科細胞生理学分野）

Yusuke Ohba, Yoichiro Fujioka, Shinya Nishide, Asuka Nanbo (*Department of Cell Physiology, Hokkaido University Graduated School of Medicine*)

3SAA-04　ATP イメージングにより明らかになったアポトーシス細胞における細胞内 ATP 濃度変化の仕組み

ATP imaging revealed a mechanism of intracellular ATP changes during apoptosis

○今村 博臣（京都大学 生命科学研究科）

Hiromi Imamura (*Graduate School of Biostudies, Kyoto University*)

3SAA-05　可溶性因子を介した免疫細胞相互作用の 1 細胞モニタリング

Monitoring immune-cell communication via soluble factors at single-cell resolution

○白崎 善隆[1,2]（[1]東大・院理, [2]理研・IMS）

Yoshitaka Shirasaki[1,2] ([1]*Grad. Sch. Sci., Tokyo Univ.*, [2]*IMS, RIKEN*)

3SAA-06　Imaging RNA in living neural circuits with hybridization-sensitive fluorescent probes

Dan Ohtan Wang[1,2] ([1]*Institute for Integrated Cell-Material Sciences, Kyoto University*, [2]*K-CONNEX*)

9:45～12:15　B 会場（中会議室 202）／Room B (Conference Room 202)

3SBA　新学術領域研究「理論と実験の協奏による柔らかな分子系の機能の科学」共催

生体分子の柔らかさと機能をつなぐもの

What connects the softness of biomolecules to their functions?

オーガナイザー：石井 邦彦（理化学研究所），井上 圭一（名古屋工業大学）

Organizers: Kunihiko Ishii (RIKEN), Keiichi Inoue (Nagoya Institute of Technology)

Many biomolecules achieve their functions through dynamically changing their conformations. Behind such dynamics-function couplings, there exist exquisite mechanisms which utilize the softness of the molecules, and each of them is accompanied with a characteristic controlling factor. In this symposium, presentations will be given by young researchers from theory and experiment focusing on various factors connecting molecular softness with biological functions. Through the discussion over a breadth of examples, we pursue a universal concept underlying the role of softness in biological systems.

3SBA-01　二次元蛍光寿命相関分光法で観るマイクロ秒領域の生体分子の熱ゆらぎ

Thermal fluctuation of biomolecular conformation on microsecond timescale detected by 2D fluorescence lifetime correlation spectroscopy

○石井 邦彦[1,2], 田原 太平[1,2]（[1]理研・田原分子分光, [2]理研・光量子工学領域）

Kunihiko Ishii[1,2], Tahei Tahara[1,2] ([1]*Molecular Spectroscopy Lab., RIKEN*, [2]*RIKEN Center for Advanced Photonics*)

3SBA-02　QM/MM RWFE-SCF 法とマイクロ秒 MD 計算によるタンパク質荷電性残基の pKa 予測

pKa prediction of ionizable residues in proteins by QM/MM RWFE-SCF method combined with microsecond-long MD simulations

○長谷川 太祐[1], 林 重彦[1]（[1]京大院理, [2]京大院理）

Taisuke Hasegawa[1], Shigehiko Hayashi[1] ([1]*Grad. Sch. Sci., Kyoto Univ.*, [2]*Grad. Sch. Sci., Kyoto Univ.*)

3SBA-03　アンキリンリピートドメインと脂質の相互作用による TRPV1 チャネル活性の制御

Regulatory mechanism of TRPV1 channel activity by the interaction of ankyrin repeat domain with phospholipids

○竹村 和浩[1], 末次 志郎[2], 北尾 彰朗[1]（[1]東大分生研, [2]NAIST バイオサイエンス）

Kazuhiro Takemura[1], Shiro Suetsugu[2], Akio Kitao[1] ([1]*IMCB, Univ. of Tokyo*, [2]*Grad. Sch. Biol. Sci., NAIST*)

3SBA-04　タンパク質を基盤とした酸素およびヘム濃度プローブ分子の開発

Protein-based molecular probes for the local concentrations of oxygen and heme

○石川 春人（阪大院理）

Haruto Ishikawa (*Grad. Scl. Sci., Osaka Univ.*)

3SBA-05　フラビン結合タンパク質は目的の機能を示すことに対してどの程度「柔らかい」か？

How are flavoproteins “soft” for exhibiting intended functions?

○岩田 達也[1,2]（[1]名古屋工業大学大学院工学研究科生命・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）

Tatsuya Iwata[1,2] ([1]*Life Sci. Appl. Chem., Grad. Sch. Eng. NITech*, [2]*OptBioTech. Res. Ctr., NITech*)

3SBA-06　DNA 整列固定技術を用いた DNA 結合蛋白質の単分子機能解析

Single-molecule characterization of DNA-binding proteins with stretchable DNA array

○鎌形 清人（東北大多元研）

Kiyoto Kamagata (*IMRAM, Tohoku Univ.*)

9:15～12:15　C 会場（中会議室 201）／Room C (Conference Room 201)

3SCA　新学術領域研究「動的構造生命科学を拓く新発想測定技術―タンパク質が動作する姿を活写する―」共催
次世代研究者による動的構造生命
Dynamic structural biology by next-generation researchers

オーガナイザー：塚崎 智也（奈良先端科学技術大学院大学），西田 紀貴（東京大学）
Organizers: Tomoya Tsukazaki (Nara Institute of Science and Technology), Noritaka Nishida (The University of Tokyo)

The recent developments of innovative technologies in the fields of X-ray crystallography, NMR, cryo-EM, high-speed AFM, and MD simulations, provided the dynamic structural information that greatly contributed to the elucidation of protein functions. In this symposium, 8 prominent young investigators, who are expected to lead the next generation of structural life sciences, will present the latest achievements in their research.

opening remarks

3SCA-01　ナノディスクに再構成した AglB タンパク質の単粒子解析
Single particle analysis of the AglB protein embedded in nanodiscs
○川崎 由貴[1], 眞柳 浩太[1], Srivastava Ashutosh[2], Tama Florence[2,3], 神田 大輔[1]（[1]九大・生医研・構造生物, [2]名大・理学・物理, [3]理研・計算科学）
Yuki Kawasaki[1], Kouta Mayanagi[1], Ashutosh Srivastava[2], Florence Tama[2,3], Daisuke Kohda[1] ([1]*Div. Struct. Biol. of Med. Inst. Bioreg., Kyushu Univ*, [2]*Dept. of Phys., Grad sch. of Sci., Nagoya Univ*, [3]*AICS., RIKEN*)

3SCA-02　染色体分配を支える CENP-A licensing 複合体の構造基盤
Structural basis of the CENP-A licensing protein complex
○有吉 眞理子, 松田 麻理子, 白川 昌宏（京大・院工）
Mariko Ariyoshi, Mariko Matsuda, Masahiro Shirakwa (*Grad. Sch. Eng., Kyoto Univ.*)

3SCA-03　フェムト秒 X 線自由電子レーザーによって明らかにされた光化学系 II 複合体の中間体構造
Crystal structure of the oxygen evolving photosystem II in the intermediate state revealed by femtosecond X-ray free electron lasers
○菅 倫寛（岡山大・異分野基礎研）
Michi Suga (*RIIS, Okayama Univ.*)

3SCA-04　高分子量タンパク質の機能的運動性を解明するための多量子 NMR 解析法の開発と応用
Developments and applications of multiple quantum NMR methods to characterize functional dynamics of high molecular weight proteins
○外山 侑樹[1,2], 加納 花穂[1], 間瀬 瑤子[1], 横川 真梨子[1], 大澤 匡範[1], 嶋田 一夫[1]（[1]東大・院薬, [2]バイオ産業情報化コンソーシアム）
Yuki Toyama[1,2], Hanaho Kano[1], Yoko Mase[1], Mariko Yokogawa[1], Masanori Osawa[1], Ichio Shimada[1] ([1]*Grad. Sch. Pharm. Sci., the Univ. of Tokyo*, [2]*JBIC*)

3SCA-05　高速 AFM を用いてタンパク質が動作する姿を活写する
Visualization of protein molecules in action by high-speed atomic force microscopy
○柴田 幹大[1,2], 古寺 哲幸[2], 内橋 貴之[1,2], 安藤 敏夫[2]（[1]金沢大・理工, [2]バイオAFM FRC）
Mikihiro Shibata[1,2], Noriyuki Kodera[2], Takayuki Uchihashi[1,2], Toshio Ando[2] ([1]*Dept. Phys., Kanazawa Univ.*, [2]*Bio-AFM FRC*)

3SCA-06　タンパク質膜透過を駆動するモータータンパク質のスナップショット
Snapshots of a protein translocation motor
○古川 新[1], 吉海江 国仁[1], 森 貴治[2], 森 博幸[3], 森本 雄祐[2], 菅野 泰功[1], 岩木 薫大[1], 南野 徹[4], 杉田 有治[2], 田中 良樹[1], 塚崎 智也[1]（[1]奈良先端大・バイオ, [2]理研, [3]京大・ウイルス研, [4]阪大・院生命機能）
Arata Furukawa[1], Kunihito Yoshikaie[1], Takaharu Mori[2], Hiroyuki Mori[3], Yusuke Morimoto[2], Yasunori Sugano[1], Shigehiro Iwaki[1], Tooru Minamino[4], Yuji Sugita[2], Yoshiki Tanaka[1], Tomoya Tsukazaki[1] ([1]*NAIST*, [2]*RIKEN*, [3]*Kyoto Univ.*, [4]*Osaka Univ.*)

3SCA-07 分子シミュレーションによる SecDF プロトン透過機構の解明
Molecular mechanisms underlying proton transport in SecDF
◯森 貴治[1,2], 田中 良樹[3], 吉海江 国仁[3], 塚崎 智也[3], 杉田 有治[1,2,4,5]（[1]理研 杉田理論分子科学, [2]理研 iTHES, [3]奈良先端大, [4]理研 AICS, [5]理研 QBiC）
Takaharu Mori[1,2], Yoshiki Tanaka[3], Kunihito Yoshikaie[3], Tomoya Tsukazaki[3], Yuji Sugita[1,2,4,5] ([1]*RIKEN Theor. Mol. Sci. Lab.*, [2]*RIKEN iTHES*, [3]*NAIST*, [4]*RIKEN AICS*, [5]*RIKEN QBiC*)

3SCA-08 フレキシブルフィッティングによる電子顕微鏡データからの構造モデリング
Structure Modeling from Cryo-EM Data using Flexible Fitting Approach
◯宮下 治（理化学研究所計算科学研究機構）
Osamu Miyashita (*RIKEN AICS*)

closing remarks

9:15〜12:15　D 会場（中ホール 300）／Room D (Convention Hall 300)

3SDA　新学術領域研究「運動超分子マシナリーが織りなす調和と多様性」共催
運動超分子マシナリーが織りなす調和と多様性
Harmonized supramolecular motility machinery and its diversity

オーガナイザー：宮田 真人（大阪市立大学），上田 太郎（早稲田大学）
Organizers: Makoto Miyata (Osaka City University), Taro QP Uyeda (Waseda University)

The molecular mechanism of force generation by “conventional” motor proteins, e.g. myosin, kinesin, and dynein, is now fairly well understood after decades of research. However, many mechanisms of motility cannot be explained using only conventional motor proteins. Such motilities are driven by highly organized structures, which we call “supramolecular motility machinery”, and their diversity records the evolutional history of life on earth. In this symposium, we will discuss about the principle and the origin of motility, based on new knowledge about poorly characterized motility mechanisms.

3SDA-01 イオン駆動型回転モーターにおけるエネルギー変換マシナリーの分子解剖：細菌べん毛モーター固定子の機能と構造
Dissection of the energy-conversion machinery in the ion-driven rotary motor: structural and functional studies of the flagellar stator
◯小嶋 誠司（名大・院理・生命理学）
Seiji Kojima (*Div. Biol. Sci., Grad. Sch. Sci., Nagoya Univ.*)

3SDA-02 好アルカリ性 *Bacillus* 属細菌と枯草菌がもつ Na^+駆動型べん毛モーターの中性環境での Na^+透過性の違いの解明
The elucidation of the Na^+-requirement mechanism for flagellar rotation between alkaliphilic and neutrophilic *Bacillus* at neutral pH
◯高橋 優嘉[1], 伊藤 政博[1,2]（[1]東洋大学 バイオ・ナノ, [2]東洋大 生命科）
Yuka Takahashi[1], Masahiro Ito[1,2] ([1]*Bio-Nano., Toyo Univ.*, [2]*Faculty of Life Sciences, Toyo Univ.*)

3SDA-03 バクテリアべん毛モーターの回転方向切り替えメカニズム
Switching mechanism of the bacterial flagellar motor
◯南野 徹（大阪大学大学院生命機能研究科）
Tohru Minamino (*Grad. Sch. Frontier Biosci, Osaka Univ.*)

3SDA-04 The actin-like cytoskeletal protein MamK plays a role in positioning of magnetic organelles for bacterial magnetotactic motility
Azuma Taoka, Yoshihiro Fukumori (*Col. Sci. and Eng., Kanazawa Univ.*)

3SDA-05 F-ATPase から進化したマイコプラズマ滑走運動
Mycoplasma gliding developed from F-type ATPase
◯宮田 真人（大阪市立大学大学院理学研究科）
Makoto Miyata (*Osaka City University*)

3SDA-06 バクテロイデーテス細菌がスムーズに滑走する仕組み
Structure and mechanism of gliding motility of *Bacteroidetes*
○柴田 敏史（長崎大学 医歯薬学総合研究科 口腔病原微生物学）
Satoshi Shibata (*Graduate Sch. of Biomedical Science, Nagasaki Univ.*)

3SDA-07 アクチンフィラメントの構造多型性：アクチン結合タンパク質の制御および細胞運動への寄与
Structural polymorphism of actin filaments: its implication in regulation of actin binding proteins and cell motility
○上田 太郎[1,2], ンゴー キエン[1], 野口 太郎[3], 長崎 晃[2], 古寺 哲幸[4], 徳楽 清孝[5]（[1]早稲田大・物理, [2]産総研・バイオメディカル, [3]都城高専・物質工学, [4]金沢大・バイオAFM, [5]室蘭工大・工）
Taro Uyeda[1,2], Kien Ngo[1], Taro Noguchi[3], Akira Nagasaki[2], Noriyuki Kodera[4], Kiyotaka Tokuraku[5] ([1]*Dept. of Physics, Waseda Univ.*, [2]*Boomed. Res. Inst., AIST*, [3]*Dept. Chem. Sci. Eng., Natl. Inst. Tech., Miyakonojo Coll.*, [4]*Bio AFM Res. Ctr., Kanazawa Univ.*, [5]*Muroran Inst. Tech.*)

9:15〜12:15　E 会場（小会議室 303）／Room E (Conference Room 303)

3SEA　多細胞合成生物学
Synthetic biology for multicellular system

オーガナイザー：木賀 大介（早稲田大学），戎家 美紀（理化学研究所）
Organizers: Daisuke Kiga (Waseda University), Miki Ebisuya (RIKEN)

Synthetic/reconstruction approach for reaction network in cells enables us to understand the network from systems science points of view. On top of construction of such network in a cell, a system with multi cell species each of which accommodates synthetic network has also been constructed in this manner. Developments in cell manipulation techniques in microfluidics or artificial organ with ES/iPS cells can be combined with the synthetic approach. In this symposium, we will introduce frontline of the approach and discuss future innovation from this field.

はじめに
木賀 大介
Daisuke Kiga

3SEA-01 Design and construction of synthetic microbial communities by combining synthetic biological subsystems
Shotaro Ayukawa (*ACLS, Tokyo Tech*)

3SEA-02 人工細胞パターン形成
Synthetic cell pattern formation
○戎家 美紀（理研QBiC）
Miki Ebisuya (*RIKEN QBiC*)

3SEA-03 Microfluidic droplet reactor for artificial/living cellular systems
Masahiro Takinoue[1,2] ([1]*Dept. Comput. Sci., Tokyo Tech*, [2]*PRESTO, JST*)

3SEA-04 Generation of a self-organizing kidney comprising multiple renal cell types
Minoru Takasato (*RIKEN CDB*)

3SEA-05 合成生物学研究のための哺乳類の in vitro 生命システム
An in vitro Living System in Mammals for Synthetic Biology Research
○田川 陽一（東京工業大学 生命理工学院）
Yoh-ichi Tagawa (*Tokyo Institute of Technology School of Life Science and Technology*)

9:45～12:15　F 会場（中会議室 406）／Room F (Conference Room 406)

3SFA　ミトコンドリアの分子マシナリーと機能管理: 合成、構造、機能、適応、そして淘汰
Management of mitochondrial functions by molecular machineries: biogenesis, structure, function, adaptation, and elimination

オーガナイザー：遠藤 斗志也（京都産業大学），鈴木 俊治（東京大学）
Organizers: Toshiya Endo (Kyoto-Sangyo University), Toshiharu Suzuki (The University of Tokyo)

In this symposium, we will discuss recent progress in the studies on mitochondrial protein machineries. Machineries for the transport of proteins and lipid (Endo) and for the cristae-formation (Oka) will be introduced, showing how the complicated mitochondrial architecture is generated. Structures and functions of the respiratory chain (Tsukihara and Kita) and FoF1-ATP synthase (Suzuki) will be discussed, emphasizing the power of X-ray analyses. The novel quality control mechanism for eliminating dysfunctional mitochondria will be shown, referring to the Parkinson-disease (Matsuda).

はじめに
鈴木 俊治
Toshiharu Suzuki

3SFA-01　タンパク質と脂質を運んでミトコンドリアをつくる仕組み
Mechanisms of mitochondrial biogenesis by protein and lipid transport
○遠藤 斗志也（京産大・総合生命）
Toshiya Endo (*Kyoto Sangyo Univ., Fac. Life Sci.*)

3SFA-02　精密 X 線結晶構造解析によるチトクロム酸化酵素の酸素還元・プロトンポンプ機構
Detailed crystal structural studies of bovine cytochrome oxidase to elucidate the coupling mechanism of dioxygen reduction and proton pump
○月原 冨武[1,2], 島田 敦広[1], 矢野 直峰[3], 村本 和優[1], 新澤- 伊藤 恭子[1], 山下 栄樹[2], 吉川 信也[1]（[1]兵県大・院生命理学, [2]阪大・蛋白研, [3]茨城大・フロンティアセンター）
Tomitake Tsukihara[1,2], Atsuhiro Shimada[1], Naomine Yano[3], Kazumasa Muramoto[1], Kyoko Shinzawa-Itoh[1], Eiki Yamashita[2], Shinya Yoshikawa[1] ([1]*Grad. Sch. Sci., Univ. Hyogo*, [2]*Institute for Protein Research, Osaka Univ.*, [3]*Front. Res. Cen. Appli. Atom. Sci., Ibaraki Univ.*)

3SFA-03　環境適応における寄生虫ミトコンドリア呼吸鎖のリモデリング
Re-modeling of respiratory chain in the parasite mitochondria during their adaptation
北 潔（長崎大学）
Kiyoshi Kita (*Nagasaki University*)

3SFA-04　どのようにして哺乳類 F_1-ATPase は回転し、そして阻害されるのか? 顕微鏡一分子観察と X 線結晶構造解析による哺乳類 F_1 の角度分割解析
How does F_1-ATPase drive rotation? Angle-divided analysis of mammalian F_1-ATPases by single-molecule and X-ray crystallographic studies
○鈴木 俊治（東大・院・工・応化）
Toshiharu Suzuki (*School of Engineering, The University of Tokyo*)

3SFA-05　PINK1 と Parkin によるミトコンドリア品質管理機構は PKA を介した MIC60 のリン酸化により制御されている
PKA-dependent phosphorylation of MIC60 controls mitochondrial clearance regulated by PINK1 and Parkin
赤羽 しおり, 宇野 碧, 島崎 俊太, ○岡 敏彦（立教大学 理学部 生命理学科）
Shiori Akabane, Midori Uno, Shunta Shimazaki, **Toshihiko Oka** (*Department of Life Sicence, Rikkyo University*)

3SFA-06　ミトコンドリア品質管理マシナリーからパーキンソン病の発症機構を明らかにする
How mitochondrial quality control machinery resists a predisposition to Parkinson's disease
○松田 憲之（都医学総合研究所, ユビキチンプロジェクト）
Noriyuki Matsuda (*Ubiquitin Project, TMIMS*)

総括
遠藤 斗志也
Toshiya Endo

9:45〜12:15　G 会場（小会議室 405）／Room G (Conference Room 405)

3SGA　人工生体プログラマブルシステム 〜精密構造設計から分子ロボティクスへ〜
Programmable bioinspired systems: Integration of precisely designed architectures towards molecular robots

オーガナイザー：石川 大輔（東京工業大学），鈴木 勇輝（東北大学）
Organizers: Daisuke Ishikawa (Tokyo Institute of Technology), Yuki Suzuki (Tohoku University)

It is one of the goal in biophysics to create artificially the dynamic structure or systems which lead the most suitable solution depending its environment and diverse functions like a cell. In recent years, there has been much efforts to construct molecular robots with sensing, computation and actuation by hybrid systems built on mechanical engineering and biology. In this symposium, we will discuss the approaches microscopically and macroscopically to integrate the dynamic systems based on a cell into a consistent system.

3SGA-01　DNA ナノ構造上に構築した化学的に制御可能なナノシステム
Chemically controllable nanosystems constructed in the DNA nanostructures
○遠藤 政幸（京都大学 物質ー細胞統合システム拠点）
Masayuki Endo (*WPI-iCeMS, Kyoto University*)

3SGA-02　Organizing DNA origami components into crystalline structures at the lipid/aqueous solution interface
Yuki Suzuki (*FRIS, Tohoku Univ.*)

3SGA-03　生態模倣アクチュエータ作製に向けた試み：液晶中での微粒子運動
Bottom-up technologies for biomimetic actuators: motion of microbeads in liquid crystals
○武仲 能子[1,2]（[1]産総研機能化学, [2]JSTさきがけ）
Yoshiko Takenaka[1,2] ([1]*RI for Sustainable Chemistry, AIST*, [2]*JST PRESTO*)

3SGA-04　脂質修飾 DNA ナノ構造体の動的な集合体制御
Dynamic assembly control of lipid-modified DNA nanostructures
○与那嶺 雄介[1,2], セルバンテスーサルゲロ ケイテル[3], 中西 和嘉[2], 南 皓輔[2], 川又 生吹[3], 村田 智[3], 有賀 克彦[2]（[1]九大院工, [2]物材機構, [3]東北大院工）
Yusuke Yonamine[1,2], Keitel Cervantes-Salguero[3], Waka Nakanishi[2], Kosuke Minami[2], Ibuki Kawamata[3], Satoshi Murata[3], Katsuhiko Ariga[2] ([1]*Grad. Sch. of Eng., Kyushu Univ.*, [2]*NIMS*, [3]*Grad. Sch. of Eng., Tohoku Univ.*)

3SGA-05　DNA のプログラマビリティを利用したカプセル型分子ロボットの創製
Microcapsular robot based on programmability of DNA
○石川 大輔（東工大・情報理工）
Daisuke Ishikawa (*Sch. Comput., Tokyo Tech.*)

3SGA-06　自然知能システム：粘菌の計算パワーを活用する
Natural Intelligence System: Exploiting Computational Power of Amoeboid Organism
○青野 真士[1,2]（[1]東工大・地球生命研, [2]JSTさきがけ）
Masashi Aono[1,2] ([1]*Earth-Life Sci. Inst., Tokyo Tech*, [2]*PRESTO, JST*)