9:00〜11:30　A 会場（一般教育棟 B 棟 1 階 B11）／Room A (B11, General Education Build. B, 1F)

1SAA　いきた形の新規生成に挑む、理論モルフォダイナミクス
Theoretical morphodynamics - towards understanding emerging shapes of life

オーガナイザー：澤井 哲（東京大学），井上 康博（京都大学）
Organizers: Satoshi Sawai (The University of Tokyo), Yasuhiro Inoue (Kyoto University)

Computational and theoretical approaches to understand dynamic forms of organs, tissues, cells and sub-cellular organelle have seen a rapid progress in recent years owing to accessibility to both computational power and high-dimensional imaging data. The symposium will bring together scientists to share their findings in systems as diverse as golgi, amoeba cells to animal tissues and discuss the surprisingly similar modeling methodologies and common agenda.

はじめに
Opening Remarks

1SAA-1　反応拡散とフェイズフィールドから理解する細胞変形と集団ダイナミクス
Understanding single and multicellular dynamics from reaction-diffusion and phase-field modeling
○澤井 哲[1], 井元 大輔[1], 斉藤 稔[2], 中島 昭彦[1], 藤森 大平[1]（[1]東京大学大学院総合文化研究科, [2]東京大学大学院理学系研究科）
Satoshi Sawai[1], Daisuke Imoto[1], Nen Saito[2], Akihiko Nakajima[1], Taihei Fujimori[1] ([1]*Grad Schl Arts & Sci, Univ Tokyo*, [2]*Grad Schl Sci, Grad Sch*)

1SAA-2　ゴルジ装置の自己組織化形成過程
Self-organized formation of Golgi body
○立川 正志（理化学研究所）
Masashi Tachikawa (*RIKEN*)

1SAA-3　フェーズフィールド法によるマクロピノサイトーシス動態の 3D シミュレーション
phease-field modeling for 3D morphodynamics of macropinocytosis
○斉藤 稔[1], 澤井 哲[2]（[1]東大・理, [2]東大・総合文化）
Nen Saito[1], Satoshi Sawai[2] ([1]*Grad. Sch. Sci., Univ. Tokyo*, [2]*Grad. Sch. Arts Sci., Univ. Tokyo*)

1SAA-4　ショウジョウバエ後腸の捻転現象を 3D バーテックスダイナミクスモデルから考える
A three-dimensional vertex dynamics model for understanding the rotating phenomenon of the hindgut of Drosophila embryo
○秋山 正和[1], 須志田 隆道[1], 井上 康博[3], 大久保 明野[2], 稲木 美紀子[2], Matsuno Kenji[2]（[1]北海道大学電子科学研究所, [2]大阪大学大学院 理学研究科 生物科学専攻, [3]京都大学 ウイルス・再生医科学研究所）
Masakazu Akiyama[1], Takamichi Sushida[1], Yasuhiro Inoue[3], Akino Ookubo[2], Mikiko Inaki[2], Kenji Matsuno[2] ([1]*Research Institute for Electronic Science, Hokkaido University*, [2]*Department of Biological Sciences Graduate School of Science Osaka University*, [3]*Department of Biosystems Science, Institute for Frontier Life and Medical Sciences, Kyoto University*)

1SAA-5 **頭蓋骨縫合線パターン形成の数理モデル化**
Modeling of skull suture pattern formation
○三浦 岳（九州大学大学院医学研究院）
Takashi Miura (*Kyushu University Graduate School of Medical Sciences*)

1SAA-6 Folding pattern formation in a confined epithelial cell sheet
Yasuhiro Inoue (*Institute for Frontier Life and Medical Sciences, Kyoto University*)

おわりに
Closing Remarks

9:00〜11:30　D 会場（一般教育棟 A 棟 3 階 A36）／Room D (A36, General Education Build. A, 3F)

1SDA　文部科学省科学研究費補助金 新学術領域研究 「3D 活性サイト科学」共催 生体分子の機能解明に向けた 3D 活性サイトの構造・ダイナミクスの新規解析法
Challenges and novel approaches to investigate the structures and dynamics of the 3D active sites in biomolecular systems for understanding the biochemical functions

オーガナイザー：鷹野 優（広島市立大学），関口 博史（高輝度光科学研究センター）
Organizers: Yu Takano (Hiroshima City University), Hiroshi Sekiguchi (Japan Synchrotron Radiation Research Institute)

To effectively exert biochemical functions, biomolecules significantly change their structures at some time and slightly change them at other time. It is required to elucidate accurate 3D-structures and dynamics of the active site, where the function is exerted, to understand the mechanism of the function. In this symposium, we present insights into 3D-structures and dynamics of the active site obtained from X-ray, neutron, electron, and scanning probe, and computer simulation, and also discuss how they contribute to the elucidation of biochemical functions.

はじめに
Opening Remarks

1SDA-1 **放射光 X 線と結晶プローブを用いたマルチマータンパク質・分子内運動解析**
Cooperative Motion Analysis of Multimeric Proteins using Synchrotron Radiation X-ray and nanocrystal
○関口 博史（公益財団法人 高輝度光科学研究センター 利用研究促進部門）
Hiroshi Sekiguchi (*JASRI/SPring-8*)

1SDA-2 Studying ion channels in reconstituted membrane using atomic force microscopy
Ayumi Sumino[1,2], Takashi Sumikama[1], Takayuki Uchihashi[3], Shigetoshi Oiki[4] ([1]*WPI-NanoLSI, Kanazawa Univ.*, [2]*InFiniti, Kanazawa Univ.*, [3]*Dept. Phys., Nagoya Univ.*, [4]*Facult. Med. Sci., Univ. Fukui*)

1SDA-3 Analysis of the picosecond dynamics of muscle contractile proteins and their hydration water by quasielastic neutron scattering
Tatsuhito Matsuo[1], Toshiaki Arata[2], Toshiro Oda[3], Kenji Nakajima[4], Seiko Kawamura[4], Tatsuya Kikuchi[4], Taiki Tominaga[5], Kaoru Shibata[4], Fumiaki Kono[1], Satoru Fujiwara[1] ([1]*QST*, [2]*Osaka Univ.*, [3]*Tokai-Gakuin Univ.*, [4]*J-PARC Center*, [5]*CROSS*)

1SDA-4 **単結晶中ヘモグロビンの包括的構造機能解析**
Comprehensive structural and functional analysis of hemoglobin in single crystals
○柴山 修哉（自治医大 生物物理）
Naoya Shibayama (*Jichi Med. Univ. Div. of Biophysics*)

1SDA-5　クライオ電子顕微鏡法による膜タンパク質複合体の構造解析
Structural Analysis of Membran Protein Complex by Cryo-EM
中西 温子[2], 岸川 淳一[2], ○光岡 薫[1], 横山 謙[2]（[1]阪大・超高圧電顕センター, [2]京産大・総合生命）
Atsuko Nakanishi[2], Jun-ichi Kishikawa[2], **Kaoru Mitsuoka**[1], Ken Yokoyama[2] ([1]*Res. Ctr. UVHEM, Univ. Osaka*, [2]*Dept. Mol. Biosci., Kyoto Sangyo Univ.*)

1SDA-6　光化学系 II 結晶における Mn4CaO5 クラスターの異常分散法を使った価数分析
Analysis of the individual valences of four Mn atoms in photosystem II crystals using anomalous diffraction technique
○梅名 泰史[1], 川上 恵典[2], 神谷 信夫[2], 沈 建仁[1]（[1]岡山大・異分野基礎研, [2]大阪市大・複合先端）
Yasufumi Umena[1], Keisuke Kawakami[2], Nobuo Kamiya[2], Shen Jian-Ren[1] ([1]*RIIS, Okayama Univ.*, [2]*The OCARINA, Osaka City Univ.*)

1SDA-7　光化学系 II 酸素発生中心における酸素分子生成および放出過程についての QM/MM 解析
QM/MM study on the O2 formation and O2 release mechanism in the oxygen-evolving complex of photosystem II
○庄司 光男[1], 磯部 寛[2], 重田 育照[1], 中嶋 隆人[3], 山口 兆[4]（[1]筑波大 CCS, [2]岡山大, [3]理研 R-CCS, [4]阪大）
Mitsuo Shoji[1], Hiroshi Isobe[2], Yasuteru Shigeta[1], Takahito Nakajima[3], Kizashi Yamaguchi[4] ([1]*CCS, Univ. Tsukuba*, [2]*Okayana Univ.*, [3]*RIKEN R-CCS*, [4]*Osaka Univ.*)

1SDA-8　Statistical and quantum-chemical analysis of the effect of heme porphyrin distortion in heme protein
Yu Takano (*Graduate School of Information Sciences, Hiroshima City University*)

おわりに
Closing Remarks

9:00〜11:30　E 会場（一般教育棟 A 棟 3 階 A37）／Room E (A37, General Education Build. A, 3F)
1SEA　日本医療研究開発機構 革新的先端研究開発支援事業（AMED-CREST/PRIME）協賛
分子から個体のメカノバイオ：多様な物理刺激とその応答
Mechanobiology from molecules to tissues: various physical stimuli and its response system

オーガナイザー：新井 敏（早稲田大学），原 雄二（京都大学）
Organizers: Satoshi Arai (Waseda University), Yuji Hara (Kyoto University)

Recent years, research topics in mechanobiology have been broaden and diversified. Focusing on each stage from molecules, cells, to tissues, we further challenge to understand how it is linked with each other through the different hierarchy. This symposium includes more recent studies on mechanobiology in various types of cells and tissues sensing different physical stimuli. The development of novel methodology is also a key topic here. We also invite several speakers less familiar with biophysical meeting and enjoy fruitful discussions.

1SEA-1　Cell surface flip-flop of phosphatidylserine is critical for PIEZO1-mediated myotube formation
Yuji Hara[1,2], Masaki Tsuchiya[1], Kotaro Hirano[1], Masato Umeda[1] ([1]*Grad. Sch. Eng., Kyoto Univ.*, [2]*AMED, PRIME*)

1SEA-2　張力センサーとしてのアクチン線維：そのゆらぎ解析
Analysis of fluctuations of a single actin filament as a tension sensor
○辰巳 仁史（金沢工業大学）
Hitoshi Tatsumi (*Kanazawa Institute of Technology (KIT)*)

1SEA-3 Matrix-force dependent integrin signalling at the podosome
Cheng-han Yu (*Univ. of Hong Kong*)

1SEA-4 細胞間相互作用が制御する T リンパ球の活性化
Cell-cell interaction among immune cells regulates T lymphocyte activation
○町山 裕亮, 横須賀 忠（東京医大・免疫）
Hiroaki Machiyama, Tadashi Yokosuka (*Dept. Immunol., Tokyo Med. Univ.*)

1SEA-5 ブリルアン散乱による多細胞システムの弾性イメージング
Elasticity imaging in multicellular systems by Brillouin scattering
○市村 垂生 [1,2], 渡邉 朋信 [1]（[1]理研 BDR, [2]大阪大学 OTRI）
Taro Ichimura[1,2], Tomonobu Watanabe[1] ([1]*RIKEN BDR*, [2]*Osaka University OTRI*)

1SEA-6 Mitochondria are physiologically maintained at close to 50 °C
Malgorzata Rak (*INSERM UMR1141/CNRS*)

1SEA-7 メカノセンサーチャネル Piezo1/2 の哺乳類生体内での役割
Mechanically activated cation channel Piezo1/2 and its physiological roles in mammals
○野々村 恵子 [1,2], Lukacs Viktor[2], Cahalan Stuart[2], 蟹江 朱美 [1], 勝田 紘基 [3], 藤森 俊彦 [1], Patapoutian Ardem[2]（[1]基生研, [2]スクリプス研究所, [3]名大・院・医）
Keiko Nonomura[1,2], Viktor Lukacs[2], Stuart Cahalan[2], Akemi Kanie[1], Hiroki Katsuta[3], Toshihiko Fujimori[1], Ardem Patapoutian[2] ([1]*NIBB*, [2]*TSRI*, [3]*Med.Grad.Nagoya Univ.*)

1SEA-8 改良型振動計による内耳ナノ振動の測定と解析
Measurement and analysis of nanoscale vibrations in the inner ear by advanced vibrometries
○日比野 浩 [1,2], 太田 岳 [1,2], 崔 森悦 [2,3], 任 書晃 [1,2]（[1]新潟大・医歯学総合・分子生理, [2]AMED-CREST, AMED, [3]新潟大・工）
Hiroshi Hibino[1,2], Takeru Ota[1,2], Samuel Choi[2,3], Fumiaki Nin[1,2] ([1]*Department of Molecular Physiology, Niigata University School of Medicine*, [2]*AMED-CREST, AMED*, [3]*Department of Electrical and Electronics Engineering, Niigata University*)

9:00〜11:30　F 会場（一般教育棟 B 棟 3 階 B32）／Room F (B32, General Education Build. B, 3F)

1SFA　細胞幾何学：時空間スケールが決める秩序と機能
Geometric cell biology: Uncovering self-organization mechanisms of ordered dynamics and cellular functions by spatio-temporal perturbation

オーガナイザー：前多 裕介（九州大学），宮﨑 牧人（京都大学）
Organizers: Yusuke T. Maeda (Kyushu University), Makito Miyazaki (Kyoto University)

Cells are growing tiny capsules whose inherent size and the phase of cell cycle are regulated through self-organization mechanism. Physical self-organization such as pattern formation or oscillation gives typical length-scale or time-scale, but this fact raises a fundamental question: What physical principle underlies behind the robust cellular size, shape and time? How one can control cellular functions by spatio-temporal perturbation? In this symposium, we will show recent developments in this field, in particular, optogenetics, microfluidics, and synthetic biology approaches.

はじめに
Opening Remarks

1SFA-1 **アクチン系細胞骨格の in vitro 再構成：運動と分裂の仕組みの包括的理解を目指して**
In vitro reconstitution of actin cytoskeleton: Toward a unified understanding of the mechanics of cell motility and division
○宮﨑 牧人 [1,2]（[1]京大・白眉, [2]京大・院理）
Makito Miyazaki[1,2] ([1]*Hakubi Center, Kyoto Univ.*, [2]*Dept. Phys. Kyoto Univ.*)

1SFA-2 What happens in the large cytoplasm of the oocyte?
Hirohisa Kyogoku, Tomoya Kitajima (*RIKEN BDR*)

1SFA-3 **細胞サイズと核内 DNA 量に依存した核のサイズの制御機構**
Nuclear size scaling with cell size and DNA content in Xenopus
○原 裕貴（山口大学理学部進化細胞生物学研究室）
Yuki Hara (*Yamaguchi University, Faculty of Science, Evolutionary Cell Biology Laboratory*)

1SFA-4 **遺伝子発現の振動パターンの光操作**
Controlling genetic oscillators by optogenetics
○磯村 彰宏 [1,2]（[1]京大 ウイ・再生研, [2]JST さきがけ）
Akihiro Isomura[1,2] ([1]*Infront, Kyoto Univ.*, [2]*JST PRESTO*)

1SFA-5 Impact of quasi-cellular structures for evolutionary dynamics of RNA
Shigeyoshi Matsumura (*Grad. Sch. Sci. Eng., Univ. Toyama*)

1SFA-6 **幾何学で紐解く細胞集団の集団運動の力学**
On the geometry and mechanics in collective cell migration
○前多 裕介, 別府 航早, 福山 達也（九大・物理）
Yusuke T. Maeda, Kazusa Beppu, Tatsuya Fukuyama (*Dept. Phys., Kyushu Univ.*)

9:00～11:30　G 会場（一般教育棟 B 棟 3 階 B33）／Room G (B33, General Education Build. b, 3F)

1SGA **文部科学省科学研究費補助金 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**
promiscuous だが洗練されたタンパク質の分子認識
Ingenious mechanisms behind promiscuous recognition, in contrast to precise recognition, by protein molecules

オーガナイザー：神田 大輔（九州大学），塚崎 智也（奈良先端科学技術大学院大学）
Organizers: Daisuke Kohda (Kyushu University), Tomoya Tsukazaki (NAIST)

In this symposium, we will focus on a special type of molecular recognition by proteins. It is extremely important to understand the recognition mechanisms of interaction partners, including drugs and target proteins, by protein molecules in various biological processes. Sometimes, their recognitions are requisitely promiscuous and dynamic. The speakers will talk about their recent structural biology studies from the viewpoint of the recognitions and interactions of proteins. We expect to discuss the basic principles behind the promiscuous recognition by contrast to the precise recognition.

はじめに
Opening Remarks

1SGA-1 **植物の自家不和合性における自己認識メカニズム**
Mechanism of self-recognition system in plant self-incompatibility
○村瀬 浩司（東大院・農生科）
Kohji Murase (*Dept. Appl. Biol. Chem., Univ. Tokyo*)

1SGA-2　セマフォリンとプレキシンが形成する低親和性だが特異的な相互作用
Low-affinity but specific interactions between semaphorin-plexin pairs
○禾 晃和（横浜市大・院生命医）
Terukazu Nogi (*Grad. Sch. Med. Lif. Sci., Yokohama City Univ.*)

1SGA-3　pH および亜鉛を利用した ERp44 による多様な基質認識の構造基盤
Structural basis of pH- and zinc-dependent multiple client recognition by ERp44
○渡部 聡 [1], 天貝 佑太 [1], Sitia Roberto[2], 稲葉 謙次 [1]（[1]東北大 多元研, [2]San Raffaele Institute）
Satoshi Watanabe[1], Yuta Amagai[1], Roberto Sitia[2], Kenji Inaba[1] ([1]*IMRAM, Tohoku Univ.*, [2]*San Raffaele Institute*)

1SGA-4　Diverse activities of molecular chaperones through non-selective binding
Tomohide Saio[1], Charalampos G. Kalodimos[2], Koichiro Ishimori[1] ([1]*Fac. of Sci. Hokkaido Univ.*, [2]*Dept. of Struct. Biol., St. Jude Child. Res. Hosp., TN*)

1SGA-5　構造平衡により規定される多剤結合転写因子 QacR の可変的転写制御
Conformational equilibrium defines variable transcriptional repression of a multidrug binding transcriptional repressor, QacR
○竹内 恒 [1], 嶋田 一夫 [2]（[1]産総研・創薬分子, [2]東京大院・薬学系）
Koh Takeuchi[1], Ichio Shimada[2] ([1]*moleprof, AIST*, [2]*Grad. Sch. Pharm. Sci, The Univ. of Tokyo*)

1SGA-6　細菌多剤排出ポンプの機能と制御
Function and Regulation of Bacterial Multidrug Transporters
○西野 邦彦（大阪大学産業科学研究所・大阪大学大学院薬学研究科）
Kunihiko Nishino (*Institute of Scientific and Industrial Research, Graduate School of Phamaceutical Sciences, Osaka University*)

おわりに
Closing Remarks

9:00～11:30　H 会場（一般教育棟 A 棟 4 階 A41）／Room H (A41, General Education Build. A, 4F)

1SHA　CREST「光の特性を活用した生命機能の時空間制御技術の開発と応用」共催
どこまで光は届くのか？　オプトジェネティクスの挑戦
Dive into Brain Abyss by Optogenetics

オーガナイザー：渡邉 宙志（東京大学），神取 秀樹（名古屋工業大学）
Organizers: Hiroshi Watanabe (The University of Tokyo), Hideki Kandori (Nagoya Institute of Technology)

Optogenetics, opened with a light-gated cation channel channelrhodopsins, has showed the great potential of photoreceptor proteins in neuro/brain science. Today, optogenetics is shifting to the next stage seeking various targets of light control, and improving control precision. In the symposium, we introduce our contributions based on biophysical approaches to the optogenetics and cooperation with other research fields by discussing the perspectives and further possibilities of optogenetics in collaboration with CREST “Development and application of optical technology for spatiotemporal control of biological functions.”

1SHA-1　微生物型ロドプシンに基づく光遺伝学ツール開発のためのボトムアップアプローチ
Bottom-up approach for microbial rhodopsin-based optogenetic tools
○小島 慧一, 須藤 雄気（岡山大・院・医歯薬(薬学系)）
Keiichi Kojima, Yuki Sudo (*Grad. Sch. of Med. Dent. Pharm. Sci., Okayama Univ.*)

1SHA-2 光遺伝学ツール開発につながる微生物型ロドプシン
Microbial rhodopsins leading to development of optogenetic tool
○今野 雅恵（名工大・院・工）
Masae Konno (*Grad. Sch. Eng., NIT*)

1SHA-3 Anion channelrhodopsin-2 の構造モデリングと分子シミュレーションによる機能メカニズム解析
Structural modeling and molecular simulations provide insights into the functional mechanism of anion channelrhodpsin-2
○渡邉 宙志 [1,2,3], 加藤 岬 [2], 石北 央 [1,2]（[1]東大・先端研, [2]東大・工・応化, [3]JST さきがけ）
Hiroshi Watanabe[1,2,3], Misaki Kato[2], Hiroshi Ishikita[1,2] ([1]*RCAST, Univ. Tokyo*, [2]*App. Chem., Grad. Sch. Eng., Univ. Tokyo*, [3]*JST, PRESTO*)

1SHA-4 Dark-active and light-inactivated G protein-coupled receptors based on an animal opsin, peropsin
Takashi Nagata[1], Mitsumasa Koyanagi[1,2], Robert Lucas[3], Akihisa Terakita[1,2] ([1]*Grad. Sch. Sci., Osaka City Univ.*, [2]*OCARINA, Osaka City Univ.*, [3]*Fac. Biol. Med. Health, Univ. Manchester*)

1SHA-5 アップコンバージョンを用いたファイバーレス光遺伝学の開発
The development of fiberless optogenetics using up conversion luminescence from lanthanide
○宮崎 杜夫 [1,2], Srikanta Chowdhury[1,2], 山下 貴之 [1,2], 八尾 寛 [3], 湯浅 英哉 [4], 山中 章弘 [1,2]([1]名古屋大学 環境医学研究所 神経系分野 2, [2]CREST 科学技術振興機構, [3]東北大学大学院 生命科学研究科 脳機能解析分野, [4]東京工業大学大学院 生命理工学研究科 分子生命科学）
Toh Miyazaki[1,2], Chowdhury Srikanta[1,2], Takayuki Yamashita[1,2], Hiromu Yawo[3], Hideya Yuasa[4], Akihiro Yamanaka[1,2] ([1]*Department of Neuroscience II Research Institute of Environmental Medicine Nagoya University*, [2]*CREST, JST*, [3]*Department of developmental biology and neuroscience, Tohoku University Graduate School of life Sciences*, [4]*Graduate School of Bioscience and Biotechnology, Tokyo Institute of Technology*)

1SHA-6 光操作によるゼブラフィッシュ小脳高次機能の解析
Optogenetic manipulation of zebrafish neural circuits toward understanding higher order function of the cerebellum
○清水 貴史 [1,2], 松田 光司 [1], 日比 正彦 [1,2]（[1]名大・生物センター, [2]名大・院生命理学）
Takashi Shimizu[1,2], Koji Matsuda[1], Masahiko Hibi[1,2] ([1]*BBC, Nagoya Univ.*, [2]*Grad. Sch. Sci., Nagoya Univ.*)

9:00〜11:30　I 会場（一般教育棟 B 棟 4 階 B41）／Room I (B41, General Education Build. B, 4F)

1SIA　細胞膜受容体の局在・会合とシグナル変換の制御
Regulation of the signal transduction in cell membrane via localization and clustering of receptors

オーガナイザー：森垣 憲一（神戸大学），鈴木 健一（岐阜大学）
Organizers: Kenichi Morigaki (Kobe University), Kenichi Suzuki (Gifu University)

Localization and clustering of molecules in cell membrane play critical roles in the signal transduction. Recent studies have suggested that dynamic localization and 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 on membrane receptors using cellular and model membranes as well as simulation to gain insight for the future directions.

1SIA-1 Regulation mechanisms of EGFR activity by ganglioside homodimer rafts as revealed by single-molecule imaging
Kenichi Suzuki (*Gifu Univ. G-CHAIN*)

1SIA-2 The function of the transmembrane-juxtamembrane region of EGFR
Takeshi Sato (*Kyoto Pharm Univ*)

1SIA-3 Dimerization-deficient opsin mutants: implications for disease
George Khelashvili, **Anant K. Menon** (*Weill Cornell Medical College*)

1SIA-4 Computer simulations of complex membrane models
D. Peter Tieleman (*University of Calgary*)

1SIA-5 Resolving the spatiotemporal organization of GPCRs in live cells with PIE-FCCS
Adam W. Smith (*The University of Akron*)

1SIA-6 Raftophilicity and aggregation of membrane proteins in the photo-transduction
Kenichi Morigaki[1,2], Yasushi Tanimoto[1], Hayato Yamashita[3], Akinori Awazu[4], Fumio Hayashi[5] ([1]*Kobe Univ. Biosignal*, [2]*Kobe Univ. Agrobioscience*, [3]*Osaka Univ. Eng. Sci.*, [4]*Hiroshima Univ. Sci.*, [5]*Kobe Univ. Sci.*)

9:00〜11:30　K 会場（一般教育棟 E 棟 1 階 E11）／Room K (E11, General Education Build. E, 1F)

1SKA　1 分子計測に立脚した新しいバイオ分析の潮流
New trends in bioanalysis based on single molecule biophysics

オーガナイザー：渡邉 力也（東京大学），小松 徹（東京大学）
Organizers: Rikiya Watanabe (The University of Tokyo), Toru Komatsu (The University of Tokyo)

Recent progress in single-molecule techniques enables highly sensitive and quantitative bioassays, and as well extends the versatility as analytical platforms, such as digital PCR, and next-generation DNA sequencers. In this symposium, we cover state-of-the-art single-molecule techniques, and aim to discuss about the new trends in bioanalysis based on single molecule biophysics.

1SKA-1 DNA ナノテクノロジーと 1 分子計測技術の融合が拓く分子動態・力の高解像イメージング
High-resolution imaging of molecular dynamics and force pioneered by DNA nanotechnology and single molecule detection techniques
○岩城 光宏 [1,2]（[1]理研・生命機能科学センター, [2]阪大・院生命機能）
Mitsuhiro Iwaki[1,2] ([1]*RIKEN, BDR*, [2]*Grad. Sch. Front. Biosci., Osaka Univ.*)

1SKA-2 高速 AFM による天然変性タンパク質 MeCP2 の一分子観察
Single-molecule visualization of intrinsically disordered Rett syndrome protein, MeCP2 by high-speed AFM
○古寺 哲幸 [1], Kalashnikova Anna[2], Porter-Goff Mary E.[2], 安藤 敏夫 [1], Hansen Jeffrey C.[2]（[1]金沢大・WPI-NanoLSI, [2]Dept. Biochem. & Mol. Biol., Colorado State Univ.）
Noriyuki Kodera[1], Anna Kalashnikova[2], Mary E. Porter-Goff[2], Toshio Ando[1], Jeffrey C. Hansen[2] ([1]*WPI-NanoLSI, Kanazawa Univ.*, [2]*Dept. Biochem. & Mol. Biol., Colorado State Univ.*)

1SKA-3 マイクロチップを利用した膜タンパク質の 1 分子機能分析
Single molecule analysis of membrane proteins by using microsystems
○渡邉 力也（東京大学大学院工学系研究科応用化学専攻）
Rikiya Watanabe (*Department of Applied Chemistry, The University of Tokyo*)

1SKA-4　酵素活性の網羅的解析（Enzymomics）法による疾患関連タンパク質の探索
Development of enzymomics approach to search for disease-related alternation of enzymatic functions
○小松 徹 [1], 小名木 淳 [1], 市橋 裕樹 [1], 坂本 眞伍 [1], 渡邉 力也 [2], 張 翼 [2], 野地 博行 [2,6], 長野 哲雄 [4], 浦野 泰照 [3,5]（[1]東京大学 大学院薬学系研究科, [2]東京大学 大学院工学系研究科, [3]東京大学 大学院医学系研究科, [4]東京大学 創薬機構, [5]AMED-CREST, [6]JST ImPACT）
Toru Komatsu[1], Jun Onagi[1], Yuki Ichihashi[1], Shingo Sakamoto[1], Rikiya Watanabe[2], Yi Zhang[2], Hiroyuki Noji[2,6], Tetsuo Nagano[4], Yasuteru Urano[3,5] ([1]*Grad. Sch. Pharm. Sci., Univ. Tokyo*, [2]*Grad. Sch. Eng., Univ. Tokyo*, [3]*Grad. Sch. Med., Univ. Tokyo*, [4]*DDI, Univ. Tokyo*, [5]*AMED-CREST*, [6]*JST ImPACT*)

1SKA-5　生体高分子スマートシーケンサに向けた 1 分子電気計測法の開発
Development of Single-Molecule Electrical Identification Method For Smart Biopolymer Sequencer
○大城 敬人（大阪大学 産業科学研究所）
Takahito Ohshiro (*Osaka University, ISIR*)

1SKA-6　細胞内全自動 1 分子解析と発展的応用
In Cell Automated Single-molecule Analysis and Its Extensive Applications
○廣島 通夫 [1,2], 安井 真人 [1], 小塚 淳 [1], 佐甲 靖志 [2], 上田 昌宏 [1]（[1]理研・BDR, [2]理研・佐甲細胞情報研究室）
Michio Hiroshima[1,2], Masato Yasui[1], Jun Kozuka[1], Yasushi Sako[2], Masahiro Ueda[1] ([1]*RIKEN BDR*, [2]*Cellular Informatics Lab., RIKEN*)

9:00〜11:30　M 会場（一般教育棟 E 棟 2 階 E21）／Room M (E21, General Education Build. E, 2F)
1SMA　生体運動システムの自律性
Autonomy integrated in motility systems

オーガナイザー：上田 太郎（早稲田大学），南野 徹（大阪大学）
Organizers: Taro Q.P. Uyeda (Waseda University), Tohru Minamino (Osaka University)

The control of the generation, directionality and transmission of force in cell motility is created by proteins that reversibly assemble into elaborate supramolecular motility machines. The dynamic assembly and disassembly of the components of these motility machines are dependent on autonomy of the proteins, rather than on chemical signals. In this symposium, we will discuss the molecular mechanisms behind such dynamic processes from the viewpoints of mechano-sensitivity, cooperativity, polymorphism and allostery, and highlight design principles that are common to apparently divergent motility systems.

1SMA-1　生体運動システムの自律性：概観
Autonomy integrated in motility systems : An overview
○上田 太郎（早稲田大・理工・物理）
Taro Uyeda (*Dept of Physics, Faculty of Sci and Eng, Waseda Univ*)

1SMA-2　Collective cell movements driven by actomyosin contractility in vertebrate embryos
Asako Shindo[1], Yasuhiro Inoue[2], John Wallingford[2], Makoto Kinoshita[1] ([1]*Grad. Sch. Sci., Nagoya Univ.*, [2]*Inst. Front. Life Med. Sci., Kyoto Univ.*, [3]*Univ. Texas*)

1SMA-3　Mechanical design principles of the cell division apparatus
Yuta Shimamoto (*Nat'l Inst Genetics*)

1SMA-4　Coulombic interaction network and novel allostery in molecular machines
Mitsunori Takano (*Dept Pure & Appl Phys, Waseda Univ*)

1SMA-5　Directed Actin Cytoskeleton Self Organization, Contractility and Motility
Laurent Blanchoin (*Biosci. Biotechnol. Inst. Grenoble, France*)

1SMA-6　Evidence for a functional actin cytoskeleton in Asgard archaea
Bob Robinson[1,2,3], Akil Caner[2,3] ([1]*Res Inst for Interdisciplinary Sci, Okayama Univ*, [2]*Institute of Molecular and Cell Biology*, [3]*Dept. of Biochem, Sch of Medicine, Natl Univ of Singapore*)

1SMA-7　バクテリアべん毛モーターの固定子再編成における自律的制御
Autonomous stator remodeling 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.*)

9:00～11:30　O 会場（一般教育棟 D 棟 3 階 D32）／Room O (D32, General Education Build. D, 3F)
1SOA　タンパク質の分子内情報伝達の動的機構と機能
The function and mechanism of intramolecular information-transmission in protein

オーガナイザー：宮下 尚之（近畿大学），米澤 康滋（近畿大学）
Organizers: Naoyuki Miyashita (KINDAI University), Yasushige Yonezawa (KINDAI University)

Dynamical intramolecular processes, which have been called "Intramolecular information-transmission", have been exhibited to the mechanism of the dynamics of an allosteric protein, a transporter and so on. The detail, however, has not been fully understood yet. In this symposium, we introduce six researches which are related to the Intramolecular Information-transmission from the different point of view, such as experiments, large-scale simulations, and simulation technique. Finally, we will discuss "the Intramolecular information-transmission" toward a first milestone.

はじめに
Opening Remarks

1SOA-1　多剤排出トランスポーター AcrB の薬剤排出メカニズムの解明
Elucidation of a drug efflux mechanism of multidrug efflux transporter AcrB
○山根 努（横浜市立大学大学院生命医科学研究科生命医科学専攻）
Tsutomu Yamane (*Graduate School of Medical Life Science, Yokohama City University*)

1SOA-2　多剤排出トランスポーター AcrB の機能的回転における構造変化パスウェイとエネルギー
Energetics and conformational pathways of functional rotation in the multidrug transporter AcrB
○松永 康佑 [1,2]（[1]理化学研究所 計算科学研究センター, [2]JST さきがけ）
Yasuhiro Matsunaga[1,2] ([1]*RIKEN Center for Computational Science*, [2]*JST PRESTO*)

1SOA-3　分子シミュレーションで探る ABC トランスポーターの構造的・機能的ダイナミクス
Structural and Functional dynamics of ABC transporters explored by molecular simulations
○古田 忠臣（東京工業大学生命理工学院）
Tadaomi Furuta (*Sch. Life Sci. Tech., Tokyo Tech*)

1SOA-4　ヒトシスチン尿症関連トランスポーターにおける軽鎖遺伝子変異から重鎖グリコシレーションへの分子内情報伝達
Intramolecular information-transmission from light chain mutation to heavy chain glycosylation in human cystinuria-related transporter
○安西 尚彦, 坂本 信一（千葉大学大学院医学研究院）
Naohiko Anzai, Shinichi Sakamoto (*Grad. Sch. Med., Chiba Univ.*)

1SOA-5 **重み付きアンサンブル法による生体分子のシミュレーション**
Weighted ensemble simulation of biomolecules
○藤崎 弘士（日本医科大学 物理学教室）
Hiroshi Fujisaki (*Nippon Medical School*)

1SOA-6 Dynamic allostery in folded protein and intrinsically disordered protein (IDP)
Shin-ichi Tate (*Dept. Mathematical and Life Sciences*)

おわりに
Closing Remarks

9:00～11:30　R 会場（一般教育棟 D 棟 4 階 D42）／Room R (D42, General Education Build. D, 4F)

1SRA　文部科学省科学研究費補助金 新学術領域研究「新光合成：光エネルギー変換システムの再最適化」共催
光合成反応中心の構築および作動原理：キノンは必須か
Structural and operating principles of photosynthtetic reaction centers: whether quinone is essential or not

オーガナイザー：大岡 宏造（大阪大学），浅井 智広（立命館大学）
Organizers: Hirozo Oh-oka (Osaka University), Chihiro Azai (Ritsumeikan University)

The photosynthetic light reaction is a process by which light energy is converted into chemical energy. The primary charge separation, followed by a series of electron transfer reactions, occurs in the reaction center pigment-protein complexes (RCs). The RCs can be classified into two major types, types I and II, dependent on their terminal acceptors. However, they have almost similar reaction manners except for the functions of quinones. We will draw structural and operating principles of RCs, and discuss their evolution scenario in the aspect of versatile physicochemical properties of quinones.

1SRA-1 **紅色細菌の LH1-RC 複合体の構造：キノンゲートはどこにあるのか**
Where is the quinone gate in purple photosynthetic bacterial LH1-RC complex?
○大友 征宇[1], 木村 行宏[2]（[1]茨城大・理, [2]神戸大・院農）
Seiu Otomo[1], Yukihiro Kimura[2] ([1]*Fac. Sci., Ibaraki Univ.*, [2]*Grad. Sch. Agri. Sci., Kobe Univ.*)

1SRA-2 **光合成反応中心蛋白質の電子移動経路におけるコファクターの酸化還元電位と電子移動反応機構**
Redox potentials of cofactors in electron transfer branches in photosynthetic reaction centers
○石北 央[1,2]（[1]東大・工・応化, [2]東大・先端研）
Hiroshi Ishikita[1,2] ([1]*Grad. Sch. Tech., Univ. Tokyo*, [2]*RCAST, Univ. Tokyo*)

1SRA-3 What can the heliobacteria teach us about the evolution of photochemical reaction centers?
Gregory S. Orf (*Center for Bioenergy & Photosynthesis, ASU*)

1SRA-4 X-ray structure of the type-I reaction center from *Heliobacterium modesticaldum* at 3.2 Å resolution
Tetsuko Nakaniwa[1], Risa Mutoh[2], Kokoro Fushimi[1,3], Aya Yasuda[1,3], Tadashi Mizoguchi[4], Hitoshi Tamiaki[4], Chihiro Azai[5], Hideaki Tanaka[1], Shigeru Itoh[6], Hirozo Oh-oka[3], Genji Kurisu[1] ([1]*IPR, Osaka Univ.*, [2]*Fac. Sci., Fukuoka Univ.*, [3]*Grad. Sch. Sci., Osaka Univ.*, [4]*Grad. Sch. Life Sci. Ritsumeikan Univ.*, [5]*Col. Life Sci., Ritsumeikan Univ.*, [6]*Grad. Sch. Sci., Nagoya Univ.*)

1SRA-5　反応中心電子受容体として機能するキノン：原始的な光合成細菌から高等植物まで
Quinones serve as an electron acceptor in photosynthetic reaction center of primitive bacteria to higher plants
○近藤 徹 [1,2]（[1]マサチューセッツ工科大学, [2]MIT-Harvard エキシトン工学センター）
Toru Kondo[1,2] ([1]*MIT*, [2]*MIT-Harvard Center for Excitonics*)

1SRA-6　Symmetry or asymmetry? - Site-specific structural modification of the homodimeric photosynthetic reaction center of green sulfur bacteria
Chihiro Azai (*Dept. Bioinfo., Col. Life Sci., Ritsumeikan Univ.*)

13:30〜16:00　B 会場（一般教育棟 A 棟 2 階 A21）／Room B (A21, General Education Build. A, 2F)

1SBP　ヘルスシステムの理解とその応用
Interdisciplinary Science and Engineering in Health Systems

オーガナイザー：井出 徹（岡山大学），早川 徹（岡山大学）
Organizers: Toru Ide (Okayama University), Tohru Hayakawa (Okayama University)

To fully understand biological systems, we need interdisciplinary personnel and tools, from single molecule physics to systems analysis. We recently established the graduate school for interdisciplinary studies and education on bio-systems. In this symposium, we will discuss proposals of interdisciplinary researches in biology based on physical, biological and medical sciences, and engineering. We will also discuss the applications of the results of such interdisciplinary cooperation to human health-systems.

1SBP-1　PCDR 法による細胞質内 RNA 送達の原理と応用
Mechanism and Application of photoinduced cytosolic dispersion of RNA (PCDR) method
○大槻 高史 [1,2], ソー テタット [2], 渡邉 和則 [2]（[1]岡大院統合科学, [2]岡大院自然）
Takashi Ohtsuki[1,2], Tet Htut Soe[2], Kazunori Watanabe[2] ([1]*Grad. Sch. of ISEHS, Okayama Univ.*, [2]*Grad. Sch. of Nat. Sci. & Tech, Okayama Univ.*)

1SBP-2　濾胞樹状細胞による抗体の親和性成熟の制御機構の解明
Immunological functions of follicular dendritic cells on affinity maturation of antibody
○曲 正樹 [1], 小川 紗也香 [2], 松岡 由希子 [2], 高田 美帆 [2], 金山 直樹 [1], 德光 浩 [1]（[1]岡山大・院ヘルスシステム統合科学, [2]岡山大・院自然科学）
Masaki Magari[1], Sayaka Ogawa[2], Yukiko Matsuoka[2], Miho Takada[2], Naoki Kanayama[1], Hiroshi Tokumitsu[1] ([1]*Grad. Sch. Interdiscip. Sci. and Eng. in Health Syst., Okayama Univ.*, [2]*Grad. Sch. of Natl. Sci. and Tech., Okayama Univ.*)

1SBP-3　Cytokine expression and immune cell function in tumor growth
Junko Masuda (*Grad. Sch. Inter. Sci. & Eng. Heal. Sys., Okayama Univ.*)

1SBP-4　自然色、形状、奥行における脳情報処理機構に関する fMRI 研究
A fMRI Brain Imaging Study for Visual Contextual Process of Color, Shape and Depth
○呉 瓊 [1], 李 春林 [2], 高橋 成子 [3], 孫 洪贇 [4], 郭 启勇 [4], 大谷 芳夫 [5], 江島 義道 [1], 呉 景龍 [1]（[1]岡大・ヘルスシステム統合科学研究科, [2]中国・首都医科大学, [3]京都市立芸術大学, [4]中国医科大学, [5]京都工芸繊維大）
Qiong Wu[1], Chunlin Li[2], Shigeko Takahashi[3], Hongzan Sun[4], Qiyong Guo[4], Yoshio Ohtani[5], Yoshimichi Ejima[1], Jinglong Wu[1] ([1]*Grad. Sch. of Interdiscip. Sci. & Eng. in Health Systems, Univ. Okayama*, [2]*Sch. of Bio. Eng., Capital Med. Univ.*, [3]*Kyoto City Univ. of Arts*, [4]*Shengjing HP of China Med. Univ.*, [5]*Kyoto Inst. of Tech.*)

1SBP-5　テラヘルツ工学による先端バイオセンシング
A terahertz technology for advanced bio-sensing
○紀和 利彦, 堺 健司, 塚田 啓二（岡山大学統合科学）
Toshihiko Kiwa, Kenji Sakai, Keiji Tsukada (*Okayama University*)

1SBP-6　Speech Enhancement of Glossectomy Patient's Speech using Voice Conversion Approach
Masanobu Abe, Hiroki Murakami, Seiya Ogino, Sunao Hara (*Okayama Univ.*)

13:30〜16:00　I 会場（一般教育棟 B 棟 4 階 B41）／Room I (B41, General Education Build. B, 4F)

1SIP　ゲノム合成時代の人工細胞研究
Artificial cell research in era of synthetic genome

オーガナイザー：野地 博行（東京大学），木賀 大介（早稲田大学）
Organizers: Hiroyuki Noji (The University of Tokyo), Daisuke Kiga (Waseda University)

An objective of artificial cell synthesis research is the identification of what makes an entity alive. The variety of new methods for the reconstitution of artificial cells is expanding because of recent progress in genome-scale DNA synthesis. Although such progress is led by the US and China, the traditional Japanese methodology of reconstitution has strong points in the new generation of artificial cell study as well. This symposium presents the Japanese situation of artificial cell research and genome synthesis, and discusses innovative ideas emerging from the combination of these two fields.

はじめに
Opening Remarks

1SIP-1　大腸菌複製サイクル再構成系を用いたセルフリー長鎖環状 DNA 合成
Cell-free synthesis of large circular DNA using a reconstitution system of replication cycle of Escherichia coli
○末次 正幸（立教大・理）
Masayuki Su'etsugu (*Col. of Sci., RIkkyo Univ.*)

1SIP-2　ゲノムシミュレーターを目指した人工細胞リアクタの開発
Artificial cell reactor towards genome simulator
○野地 博行（東京大学工学研究科）
Hiroyuki Noji (*Graduate School of Engineering, The University of Tokyo*)

1SIP-3　ゲノムサイズ DNA の脂質膜への自発的包埋
Spontaneous enveloping of genome-size DNA into lipid membrane
○鈴木 宏明 [1], 津金 麻実子 [1,2], 須永 史子 [1], 岡野 太治 [1]（[1]中大理工, [2]学振）
Hiroaki Suzuki[1], Mamiko Tsugane[1,2], Fumiko Sunaga[1], Taiji Okano[1] ([1]*Chuo University*, [2]*JSPS*)

1SIP-4　Synthetic Genomics for the Human Noncoding Regions
Yasunori Aizawa (*Tokyo Institute of Technology*)

1SIP-5　人工細胞内で RNA ゲノムの協力性は持続し進化するのか？
Sustainability and evolvability of cooperative RNAs in an artificial cell-like system
○市橋 伯一（大阪大学）
Norikazu Ichihashi (*Osaka University*)

1SIP-6 **遺伝暗号の改変による生物学的封じ込め**
Biological containment through engineering of genetic code
○木賀 大介（早稲田大学）
Daisuke Kiga (*Waseda University*)

2 日目（9 月 16 日（日））／Day 2（Sep. 16 Sun.）

9:00～11:30　A 会場（一般教育棟 B 棟 1 階 B11）／Room A (B11, General Education Build. B, 1F)
2SAA　Taiwan-Japan biophysics symposium on molcular motors *in vivo*

Organizers: Chien-Jung (National Central University, Taiwan), Kumiko Hayashi (Tohoku University)

The molecular motors have been studied intensively by single molecule experiments, however their functions in vivo have not been clarified yet. Then this symposium aims to bring together the leading international scientists of frontier biophysical researches on functions and strucutres of molecular motors. The open and international symposium offers a good opportunity for young scientists from Taiwan and Japan to exchange scientific opinions on the issue.

2SAA-1 Non-invasive force measurement reveals the number of active kinesins on a synaptic vesicle precursor regulated by ARL-8
Kumiko Hayashi[1,2], Shin Hasegawa[1], Takashi Sagawa[3], Sohei Tasaki[4,5], Shinsuke Niwa[4] ([1]*Sch. Eng., Tohoku Univ.*, [2]*PRIME, AMED*, [3]*NICT*, [4]*FRIS, Tohoku Univ.*, [5]*BDR, RIKEN*)

2SAA-2 Accommodation of mRNA on the ribosome during translation initiation
Jin-Der Wen (*Institute of Molecular and Cellular Biology, National Taiwan University*)

2SAA-3 Single-Molecule Study of Swi5-Sfr1 Stimulation on Rad51 Recombinase Filament Assembly in Mouse and Yeast
Hung-Wen Li[1], Chih-Hao Lu[1], Peter HY Chi[1], Hiroshi Iwasaki[2] ([1]*National Taiwan University*, [2]*Tokyo Institute of Technology*)

2SAA-4 Mechanics of the bacterial flagellar motor in vivo
Tsubasa Ishida[1], Taishi Kasai[2,3], Yong-Suk Che[4,5], **Yoshiyuki Sowa**[1,2,4] ([1]*Grad. Sch. Sci. & Eng., Hosei Univ.*, [2]*Micro-Nano Tech, Hosei Univ.*, [3]*Dept. Life Sci., Rikkyo Univ.*, [4]*Dept. Frontier Biosci., Hosei Univ.*, [5]*Grad. Sch. Frontier Biosci., Osaka Univ.*)

2SAA-5 Measurement for the chemotaxis proteins and cellular behavior in single *E. coli* cell
Hajime Fukuoka (*Grad. Sch. Frontier Biosci., Osaka Univ.*)

2SAA-6 Probing bacterial flagellar growth by real-time fluorescence imaging
Chien-Jung Lo (*National Central University, Taiwan*)

9:00〜11:30　B 会場（一般教育棟 A 棟 2 階 A21）／Room B (A21, General Education Build. A, 2F)

2SBA　クライオ電子顕微鏡
Cryo electron microscopy

オーガナイザー：千田 俊哉（高エネルギー加速器研究機構），Zhenfeng Liu（Chinese Academy of Science）
Organizers: Toshiya Senda (High Energy Accelerator Research Organization), Zhenfeng Liu (Chinese Academy of Science)

Due to recent developments of direct electron detection cameras, improved microscope design and advanced data-processing programs, cryo-electron microscopy (cryo-EM) is rapidly becoming a main technology for studying three-dimensional (3D) structures of proteins and their complexes at near atomic resolution. Since cryo-EM technique does not require crystallization of target proteins, it has been intensively applied in analyzing 3D structures of proteins that are difficult to crystallize, such as membrane protein complexes and supramolecular complexes. In addition, cryo-EM tomography has revealed 3D architectures of protein complexes at their native cellular localizations. Cryo-EM techniques are opening a new era in structural biology and cellular biology. In this symposium, recent results of cryo-EM studies will be presented by researchers from China and Japan.

はじめに
Opening Remarks

2SBA-1　Structural Insights into Light Harvesting and Its Regulation in Plants
Zhenfeng Liu (*Institute of Biophysics, Chinese Academy of Sciences*)

2SBA-2　エボラウイルス・ヌクレオ蛋白質−RNA 複合体のクライオ電子顕微鏡構造
Structure of Ebola virus nucleoprotein-RNA complex by single-particle cryo-electron microscopy
○杉田 征彦 [1,2], 松波 秀行 [1], 河岡 義裕 [3,4], 野田 岳志 [5], ウォルフ マティアス [1]（[1]沖縄科学技術大学院大学, [2]阪大蛋白研, [3]東大医科研, [4]ウィスコンシン大学マディソン校, [5]京大ウイルス・再生研）
Yukihiko Sugita[1,2], Hideyuki Matsunami[1], Yoshihiro Kawaoka[3,4], Takeshi Noda[5], Matthias Wolf[1] ([1]*OIST*, [2]*IPR, Osaka Univ.*, [3]*Inst. Med. Sci., Univ. Tokyo*, [4]*UW-Madison*, [5]*Inst. Front. Life Med. Sci., Kyoto Univ.*)

2SBA-3　Structure of Origin Recognition Complex Bound to Autonomously Replicating Sequence
Ning Gao (*School of Life Sciences, Peking University*)

2SBA-4　クライオ電子トモグラフィーを用いたゼブラフィッシュ繊毛における PIH タンパク質の機能解析
Cryo-electron tomography revealed zebrafish axonemal dyneins assembled by distinct PIH proteins
○山口 博史 [1], 小田 賢幸 [2], 吉川 雅英 [1], 武田 洋幸 [3]（[1]東大・院医, [2]山梨大・院医, [3]東大・院理）
Hiroshi Yamaguchi[1], Toshiyuki Oda[2], Masahide Kikkawa[1], Hiroyuki Takeda[3] ([1]*Grad. Sch. Med., Univ. Tokyo*, [2]*Grad. Sch. Med., Univ. Yamanashi*, [3]*Grad. Sch. Sci., Univ. Tokyo*)

2SBA-5　クライオ電子顕微鏡で明らかになったコフィリンによるアクチン線維分解機構
Structural basis of cofilin binding and disassembling of actin filaments revealed by cryo-electron microscopy
○成田 哲博（名古屋大学理学研究科）
Akihiro Narita (*Nagoya University*)

2SBA-6　Structure of phycobilisome
Sen-Fang Sui (*School of Life Sciences, Tsinghua University*)

おわりに
Closing Remarks

9:00～11:30　D 会場（一般教育棟 A 棟 3 階 A36）／Room D (A36, General Education Build. A, 3F)
2SDA　日本医療研究開発機構（AMED）・創薬等ライフサイエンス研究支援基盤事業 共催
創薬等先端技術支援基盤プラットフォーム (BINDS)
Basis for Supporting Innovative Drug Discovery and Life Science Research (BINDS)

オーガナイザー：田之倉 優（東京大学），由良 敬（早稲田大学）
Organizers: Masaru Tanokura (The University of Tokyo), Kei Yura (Waseda University)

For application of excellent basic research outcomes in Japan to medicine and drugs, the Basis for Supporting Innovative Drug Discovery and Life Science Research (BINDS) supports drug discovery research in universities and academic research institutions by establishing platform for drug discovery and medical technology, where high technology and facilities are shared for life science research. This symposium provides a forum for developing advanced discussions on life science research including academic drug discovery by giving a lecture from BINDS program officers and researchers.

はじめに
Opening Remarks

2SDA-1　創薬等ライフサイエンス研究のための相関構造解析プラットフォーム
Correlative Structural Analysis Platform for Drug Discovery and Life Sciences
○山本 雅貴（理化学研究所 放射光科学研究センター）
Masaki Yamamoto (*RIKEN SPring-8 Center*)

2SDA-2　創薬における実験化学と計算化学の融合
Integration of experimental and computational chemistry in drug discovery
○上村 みどり（帝人ﾌｧｰﾏ(株）生物医学総合研究所）
Midori Takimoto-Kamimura (*Teijin Institute for Biomedical Research*)

2SDA-3　蛋白質相互作用の物理化学的解析と次世代創薬
Physicochemical Analyses of Protein Interactions for Next Generation Drug Discovery and Development
○津本 浩平, 長門石 曉（東京大学大学院工学系研究科・医科学研究所）
Kouhei Tsumoto, Satoru Nagatoishi (*School of Engineering and Institute of Medical Science, The University of Tokyo*)

2SDA-4　BINDS バイオロジカルシーズ探索ユニットにおける支援内容のご紹介
BINDS: supporting platform to explore biological activity of your seeds
○古関 明彦（理化学研究所・生命医科学研究センター）
Haruhiko Koseki (*RIKEN center for integrative medical sciences*)

2SDA-5　インシリコ創薬の展望
Perspective of in silico drug discovery
○田中 成典（神戸大学大学院システム情報学研究科）
Shigenori Tanaka (*Kobe University*)

2SDA-6　生命科学データベースの接続をめざす VaProS から見えてくるあらたな知見
New knowledge and ideas found through VaProS, an application for life science database integration
○由良 敬[1,2]（[1]早大・先進理工, [2]お茶大・生命情報）
Kei Yura[1,2] ([1]*Dept. Life Sci. & Med. Bio., Waseda Univ.*, [2]*Info. Bio., Ochanomizu Univ.*)

おわりに
Closing Remarks

9:00〜11:30　E 会場（一般教育棟 A 棟 3 階 A37）／Room E (A37, General Education Build. A, 3F)

2SEA　機械シグナル受容応答機構解明に向けた最先端研究と未来
Keynote of mechanosignal response for the future of mechanobiology

オーガナイザー：森松 賢順（岡山大学），中澤 直高（京都大学）
Organizers: Masatoshi Morimatsu (Okayama University), Naotaka Nakazawa (Kyoto University)

Mechanosignals on the cell- extracellular matrix and cell-cell adhesions exert profound influences on cell migration, proliferation and stem-cell differentiation. However, the fundamental mechanisms of how cells detect and respond to mechanosignals remain poorly understood.We invite the front runners of this field to this symposium to share their latest research. Furthermore, we would like to discuss the next stage of this field with the presenters and the audience at the panel session.

はじめに
Opening Remarks

2SEA-1　The molecular clutch model as a framework to understand integrin-mediated mechanotransduction
Pere Roca-Cusachs (*Institute for Bioengineering of Catalonia*)

2SEA-2　Single-molecule measurements of force transmission by integrin heterodimers in living cells
Alexander Dunn (*Stanford University*)

2SEA-3　α カテニンの張力応答性分子機構と上皮形態形成
Force-sensing device region of alpha-catenin and epithelial morphogenesis
○米村 重信 [1,2]（[1]徳島大・院医歯薬学, [2]理研・生命機能科学）
Shigenobu Yonemura[1,2] ([1]*Tokushima Univ. Grad. Sch. Med. Sci.*, [2]*Riken BDR*)

2SEA-4　細胞増殖における接触阻害のメカノバイオロジー
Mechanobiology of the contact inhibition in cell proliferation
○曽我部 正博, 平田 宏聡（名大院・医・メカノバイオロジー・ラボ）
Masahiro Sokabe, Hiroaki Hirata (*Mechanobiology Lab, Nagoya Univ., Grad., Sch., Med.*)

2SEA-5　Rigidity Sensing and Transformed cell growth
Michael Sheetz (*Mechanobiology Institute, Singapore, National University of Singapore*)

おわりに
Closing Remarks

9:00〜11:30　F 会場（一般教育棟 B 棟 2 階 B32）／Room F (B32, General Education Build. B, 2F)
2SFA　JST-CREST「超絶縁性脂質二分子膜に基づくイオン・電子ナノチャネルの創成」共催
生体機能の再構成によるセンシング技術とデバイス応用
Reconstruction of biological functions for sensing methods and device applications

オーガナイザー：手老 龍吾（豊橋技術科学大学），平野 愛弓（東北大学）
Organizers: Ryugo Tero (Toyohashi University of Technology), Ayumi Hirano-Iwata (Tohoku University)

Molecular recognition properties of sugar chains and proteins are important research subjects in the fields of medicine and drug discovery, which have recently been integrated with device technology as multifunctional elements. This symposium addresses new devices that reconstitute biological functions on the levels of molecules, viruses and cells. We will introduce pioneering research achievements in which nanomaterials and microfabrication techniques were applied to integration of novel biosensing devices, and discuss current subjects and future perspectives.

はじめに
Opening Remarks

2SFA-1　細胞機能解析を目指した非標識神経伝達物質イメージセンサ
Non Label Nurotransmitter Image Sesnor for for Analysis of Cerebral Function
○澤田 和明, 李 宥奈, 岩田 達哉, 高橋 一浩（国立大学法人豊橋技術科学大学）
Kazuaki Sawada, Youna Lee, Tatsuya Iwata, Kazuhiro Takahashi (*Toyohashi University of Technology*)

2SFA-2　オンチップ・セロミクス：「履歴・記憶」と「集団効果」から見た細胞ネットワークの後天的情報の理解
On-chip Cellomics: Reconstructive Understanding of Epigenetic Information in Cellular Networks from Algebraic and Geometric Perspectives
○安田 賢二（早稲田大学 理工学術院 先進理工学部 物理学科）
Kenji Yasuda (*Department of Physics, Waseda University*)

2SFA-3　Microfabricated Silicon Devices for Ion Channel Reconstitution
Ayumi Hirano-Iwata (*Advanced Institute for Materials Research, Tohoku University*)

2SFA-4　High Sensitive Virus Sensing by Sugar Chain Modified Graphene FET
Kazuhiko Matsumoto (*Institute of Scientific & Industrial Research, Osaka University*)

9:00〜11:30　G 会場（一般教育棟 B 棟 3 階 B33）／Room G (B33, General Education Build. B, 3F)
2SGA　ポスト「京」重点課題 1 「生体分子システムの機能制御による革新的創薬基盤の構築」共催
マルチスケール・フィジクスで見えてくる生体高分子のダイナミクスと機能機序
Mechanism of Biomolecular Dynamics and Function Revealed by Multiscale Physics

オーガナイザー：河野 秀俊（量子科学技術研究開発機構），寺田 透（東京大学）
Organizers: Hidetoshi Kono (QST), Tohru Terada (The University of Tokyo)

Different scales of physics have been applied to understand various phenomena in biology. Quantum mechanics, for instance, provide the mechanism of enzymes, all atom simulations can show how molecule changes the conformation less than micro-second, and coarse-grained simulations now nearly reach the time scale directly comparable with wet-experiments. Integrating the different scales of physics can deepen our understanding on biomolecules. In this symposium, approaches utilizing different spatio-temporal scales will be introduced to elucidate how biomolecules behave and function. In addition, possible simulations with post-K computer will be proposed.

はじめに
Opening Remarks

2SGA-1 ハイブリッド分子シミュレーションによる光受容体タンパク質の分子機能ダイナミクスの解明
Functional Molecular Dynamics of Photo-Receptor Proteins Revealed by a Hybrid Molecular Simulation Technique
○林 重彦（京都大学大学院理学研究科化学専攻）
Shigehiko Hayashi (*Dept. Chem., Grad. Sch. Sci., Kyoto Univ.*)

2SGA-2 全原子分子動力学シミュレーションによるヌクレオソーム内・間相互作用の自由エネルギープロファイル
Free energy profiles of the intra- and inter-nucleosomal interactions by all-atom molecular dynamics simulations
○石田 恒, 河野 秀俊（量研・量子ビーム・生体分子シミュレーション）
Hisashi Ishida, Hidetoshi Kono (*National Institutes for Quantum and Radiological Science and Technology*)

2SGA-3 大規模計算によるマルチコピーマルチスケールシミュレーションとその応用研究
Multicopy/multiscale simulations and their applications using massive computing
○森次 圭 [1], 寺田 透 [2], 石田 竜次 [1], 木寺 詔紀 [1]（[1]横浜市立院・生命医, [2]東大・情報学環）
Kei Moritsugu[1], Tohru Terada[2], Ryuji Ishida[1], Akinori Kidera[1] ([1]*Grad. Sch. Med. Life Sci., Yokohama City Univ.*, [2]*III, Univ. Tokyo*)

2SGA-4 マルコフ状態モデルによるタンパク質の立体構造変化のダイナミクス解析
Analysis of the dynamics of protein conformational change using Markov state model
○寺田 透 [1,2], 根上 樹 [2]（[1]東大・情報学環, [2]東大・院農）
Tohru Terada[1,2], Tatsuki Negami[2] ([1]*III, Univ. Tokyo*, [2]*Grad. Sch. Agr. Life Sci., Univ. Tokyo*)

2SGA-5 Quantitative Coarse-Grained Molecular Modeling of Biomembranes
Wataru Shinoda (*Nagoya Univ.*)

2SGA-6 Investigating Genome Organization and Regulation with Coarse-Grained Molecular Simulations
Cheng Tan, Shoji Takada (*Dept. Biophysics, Grad. Sch. Sci., Kyoto Univ.*)

2SGA-7 タンパク質の構造揺らぎを考慮したリガンド結合部位解析と創薬支援
Ligand binding site analysis with protein flexibility for drug design
○広川 貴次（産業技術総合研究所・創薬プロ研）
Takatsugu Hirokawa (*molprof, AIST*)

おわりに
Closing Remarks

9:00〜11:30　H 会場（一般教育棟 A 棟 4 階 A41）／Room H (A41, General Education Build. A, 4F)

2SHA　ゲノム時代が切り拓く光生物の沃野
The new fertile land of photobiology opened in genomic era

オーガナイザー：井上 圭一（東京大学），山下 高廣（京都大学）
Organizers: Keiichi Inoue (The University of Tokyo), Takahiro Yamashita (Kyoto University)

Photoreceptor proteins can be instantaneously triggered by light. This unique property has been a big advantage for providing important information about the structure and function relationships of proteins. Recently, rapid accumulation of genomic data has unveiled novel photoreceptor proteins that have unexpected functions. In this symposium, we would like to introduce frontier studies of photoreceptor proteins in the genomic era and discuss about a variety of connections between light and life and future applications to optogenetics.

はじめに
Opening Remarks

2SHA-1　ゲノム科学により拡がる新奇微生物型ロドプシンの多様性と光化学
New diversity of microbial rhodopsins revealed by genome science
○井上 圭一 [1,2]（[1]東大物性研, [2]JST・さきがけ）
Keiichi Inoue[1,2] ([1]*Univ. Tokyo, Inst. Solid State Phys.*, [2]*JST PRESTO*)

2SHA-2　PYP タンパク質における多様な分光学的性質と相互作用
Divergent spectroscopic features and interactions of PYP proteins
○山崎 洋一（奈良先端科学技術大学院大学先端科学技術研究科物質創成科学領域）
Yoichi Yamazaki (*Division of Materials Science, Graduate School of Science and Technology, NAIST*)

2SHA-3　Flavin 結合タンパク質の光反応の多様性
Diversity of photochemical reactions of Flavin-based photoreceptors
○中曽根 祐介（京大院理）
Yusuke Nakasone (*Graduate school of Science, Kyoto University*)

2SHA-4　Cyanobacteriochromes covering UV-to-FR region: Newcomers to the photoreceptor field potentially useful for bio-imaging and optogenetics
Rei Narikawa (*Dept. Biol. Sci., Shizuoka Univ.*)

2SHA-5　オプトジェネティクス応用へ向けた酵素型ロドプシンの分子機構理解
Enzyme rhodopsins -molecular properties of potential optogenetics tools-
○角田 聡 [1,2]（[1]JST さきがけ, [2]名古屋工業大学 大学院工学研究科 生命応用化学専攻）
Satoshi Tsunoda[1,2] ([1]*JST PRESTO*, [2]*Nagoya Institute of Technology*)

2SHA-6　脊椎動物の暗所視獲得プロセスを再考する
Revisit of the acquisition process of vertebrate scotopic vision
○山下 高廣（京大・院理・生物物理）
Takahiro Yamashita (*Dept. of Biophys., Grad. Sch. of Sci., Kyoto Univ.*)

おわりに
Closing Remarks

9:00〜11:30　K 会場（一般教育棟 E 棟 1 階 E11）／Room K (E11, General Education Build. E, 1F)

2SKA　X 線自由電子レーザーと融合分野が拓くタンパク質反応ダイナミクスの新しい計測
New approaches to protein reaction dynamics pioneered by X-ray free electron lasers and interdisciplinary collaborations

オーガナイザー：久保 稔（兵庫県立大学），南後 恵理子（理化学研究所）
Organizers: Minoru Kubo (University of Hyogo), Eriko Nango (RIKEN)

Time-resolved crystallography using X-ray free electron lasers (XFELs) is being established and increasingly applied to proteins for visualizing their structural dynamics as "molecular movies". Interdisciplinary collaborations of this XFEL technique with other advanced techniques will take us to the next stage of structural biophysics. In this symposium, researchers at the forefront of various fields, such as spectroscopy, solution scattering, chemical biology, computation, as well as XFEL crystallography, will present their techniques and latest applications. We will also discuss the possible interplay of different techniques and future prospects of protein dynamics science.

はじめに
Opening Remarks

2SKA-1　XFEL analysis of light-mediated pyrimidine dimer repair by DNA photolyase
Yoshitaka Bessho[1,2] ([1]*Academia Sinica, IBC*, [2]*RIKEN SPring-8 Center*)

2SKA-2　細胞内結晶工学を利用したタンパク質結晶の機能設計
Functional design of protein crystals by in vivo crystal engineering
○安部 聡, 上野 隆史（東工大 生命理工）
Satoshi Abe, Takafumi Ueno (*Sch. Life Sci. Technol. Tokyo Tech.*)

2SKA-3　X 線自由電子レーザーによる生体高分子 X 線溶液散乱
BioSAXS with X-ray Free Electron Lasers
○清水 伸隆（高エネ機構・物構研・放射光）
Nobutaka Shimizu (*PF, IMSS, KEK*)

2SKA-4　QM/MM 法による金属酵素の構造活性相関の研究
QM/MM studies on structure-function relationships of metalloenzymes
○重田 育照（筑波大学計算科学研究センター）
Yasuteru Shigeta (*Center for Computational Sciences, University of Tsukuba*)

2SKA-5　X 線自由電子レーザーによるタンパク質中で起こる化学反応の三次元動画
Three-dimensional movie of chemical reactions in proteins captured by X-ray free electron lasers
○岩田 想（京都大学医学部）
So Iwata (*Kyoto Univ. Grad.Sch.Med.*)

2SKA-6　フェムト秒ラマン分光による光受容タンパク質の超高速構造ダイナミクスの観測
Ultrafast structural dynamics of photoreceptor proteins revealed by femtosecond Raman spectroscopy
○田原 太平 [1,2]（[1]理化学研究所 田原分子分光研究室, [2]理化学研究所 光量子工学領域）
Tahei Tahara[1,2] ([1]*Molecular Spectroscopy Laboratory, RIKEN*, [2]*RIKEN Center for Advanced Photonics (RAP)*)

9:00〜11:30　M 会場（一般教育棟 E 棟 2 階 E21）／Room M (E21, General Education Build. E, 2F)

2SMA　文部科学省科学研究費補助金 新学術領域研究「発動分子科学：エネルギー変換が拓く自律的機能の設計」共催
創って知る生物物理：生命現象の再構成と理解
Designing biological systems from scratch

オーガナイザー：多田隈 尚史（大阪大学），古田 健也（情報通信総研究機構）
Organizers: Hisashi Tadakuma (Osaka University), Ken'ya Furuta (NICT)

Biological systems are driven by intra- and inter-molecular orchestration of diverse molecules. Recent advances of biophysical techniques allow us to design the molecules and the systems from scratch. In this symposium, we will discuss the bottom up molecular design approach to understand the mechanisms of various life phenomena, ranging from the molecules to cells.

はじめに
Opening Remarks

2SMA-1　ATP 結合部位の合理設計: 分子モーターを理解する試み
Rational Design of ATP Binding Site: An Attempt to Understand Molecular Motor
○小杉 貴洋 [1,2,3]（[1]分子研・CIMoS, [2]総研大, [3]生命創成探究センター）
Takahiro Kosugi[1,2,3] ([1]*CIMoS, IMS*, [2]*SOKENDAI*, [3]*ExCELLS*)

2SMA-2　生物分子モーターの再デザイン
Re-design of biomolecular motors
指宿 良太 [1], 古田 茜 [2], 大岩 和弘 [1,2], 小嶋 寛明 [2], ○古田 健也 [2]（[1]兵庫県立大学, [2]国立研究開発法人情報通信研究機構）
Ryota Ibusuki[1], Akane Furuta[2], Kazuhiro Oiwa[1,2], Hiroaki Kojima[2], **Ken'ya Furuta**[2] ([1]*University of Hyogo*, [2]*National Institute of Information and Communications Technology*)

2SMA-3　Design and evolution of synthetic nucleocapsids
Marc Lajoie (*Univ Washington, Molecular Engineering and Sciences*)

2SMA-4　集積型遺伝子チップの構築
Construction of integrated gene chip
○多田隈 尚史（大阪大学 蛋白質研究所）
Hisashi Tadakuma (*IPR Osaka University*)

2SMA-5　Structural DNA Nanotechnology: Complex Self-Assembly and Applications
Yonggang Ke (*Emory University*)

2SMA-6　RNA synthetic biology and nanotechnology to program cells
Hirohide Saito (*Kyoto University, CiRA*)

9:00～11:30　O 会場（一般教育棟 D 棟 3 階 D32）／Room O (D32, General Education Build. D, 3F)

2SOA　ピコバイオロジーが目指すもの
Developments and future of piocobiology

オーガナイザー：水谷 泰久（大阪大学），中島 聡（奈良先端科学技術大学院大学）
Organizers: Yasuhisa Mizutani (Osaka University), Satoru Nakashima (NAIST)

All physiological processes are comprised of chemical reactions, each driven by proteins. The field of picobiology is defined as an aim to understand the mechanism of physiological processes by performing the picometer-level structural analyses to characterize the location and states of individual atoms of the functional centers that drive the physiological processes. The symposium focuses on developments and future of piocobiology based on studies using crystallography, vibrational spectroscopy, and synthetic chemistry on active sites.

はじめに
Opening Remarks

2SOA-1　脱窒菌の一酸化窒素還元酵素：反応機構と分子進化
Bacterial Nitric Oxide Reductases: Reaction Mechanism and Molecular Evolution
○城 宜嗣（兵庫県立大学大学院生命理学研究科）
Yoshitsugu Shiro (*U. Hyogo*)

2SOA-2　Development of Raman spectroscopic measurement system for analyzing the enzymatic reaction with gaseous substrate
Koji Nishikawa, Yuka Nakagawa, Yoshiki Higuchi, Takashi Ogura (*Grad. Sch. Sci., Univ. Hyogo*)

2SOA-3　Picobiology of metalloproteins: Vibrational spectroscopic studies of cytochrome *c* and hydrogenase
Shun Hirota[1], Hulin Tai[1], Yoshiki Higuchi[2], Sachiko Yanagisawa[2], Takashi Ogura[2] ([1]*Grad. Sch. Sci. Tech., Nara Inst. Sci. Tech.*, [2]*Grad. Sch. Sci., Univ. Hyogo*)

2SOA-4　時間分解振動分光法によるチトクローム酸化酵素のプロトンポンプ機構
Proton pumping mechanism of cytochrome *c* oxidase by time-resolved vibrational spectroscopy
○中島 聡（奈良先端科学技術大学院大学）
Satoru Nakashima (*Nara Institute for Science and Technology*)

2SOA-5　Oxygen Activation Mechanism by Copper Monooxygenases and Models
Shinobu Itoh (*Osaka University*)

2SOA-6　イオン液体中における小分子活性化の分光学的アプローチ
Spectroscopic study on the activation of CO_2 and N_2 in an ionic liquid
○増田 秀樹（名古屋工業大学）
Hideki Masuda (*Nagoya Institute of Technology*)

2SOA-7　シトクロム *c* 酸化酵素における触媒反応のピコバイオロジー
Pico-biology in Catalytic Reactions of Cyotchrome *c* Oxidase
○北川 禎三（兵県大・院生命理学）
Teizo Kitagawa (*Grad.Sch.Sci.Univ.Hyogo*)

14:00〜16:30　B 会場（一般教育棟 A 棟 2 階 A21）／Room B (A21, General Education Build. A, 2F)

2SBP　Strategic Japan-Singapore Research Program by JST and A*STAR:
New optical platform for mechanics of cellular-self-organization　共催
細胞の形態形成を制御する自己組織化メカニクス
Mechanical self-organization in cellular morphogenesis

オーガナイザー：茂木 文夫（Temasek Lifesciences Laboratory），**大浪 修一**（理化学研究所）
Organizers: Fumio Motegi (Temasek Lifesciences Laboratory), Shuichi Onami (RIKEN)

Physical force has been emerged as new discipline in cell physiology. Mechanical strains play a crucial role in biological self-organization, by which cellular components become ordered in space and time, leading to emergence of functional biological patterns. This symposium will feature 1) innovative techniques to visualize interplay between molecular components and mechanical forces applied on cellular architectures, and 2) the unifying principle in cellular self-organizing mechanics, which underlies development and function of many cell types, including embryos, neurons, hepatocyte cells, and ES-derived tissues.

はじめに
Opening Remarks

2SBP-1　Deconstruction and reconstruction of cell polarity networks
Fumio Motegi[1,2,3] ([1]*Temasek Lifesciences Lab.*, [2]*Mechanobiology Institute*, [3]*National Univ. of Singapore*)

2SBP-2　微小管の構造変化による細胞内物質輸送の極性制御
Conformational switching of microtubule as the basis for the polarized intracellular transport
○岡田 康志 [1,2]（[1]理研　生命機能科学研究センター, [2]東大・理・物理，生物普遍性研究機構）
Yasushi Okada[1,2] ([1]*Center for Biosystems Dynamics Research (BDR), RIKEN*, [2]*Dept Phys & Univ Biol Inst (UBI), Univ Tokyo*)

2SBP-3　The cytoskeleton as a smart composite material: A unified pathway linking microtubules, myosin-II filaments and integrin adhesions
Rafiq Nisha Bte Mohd[1], Yukako Nishimura[1], Sergey V. Plotnikov[2], Visalatchi Thiagarajan[1], Zhen Zhang[1], Meenubharathi Natarajan[1], Shidong Shi[1], Viasnoff Virgile[1,3,4], Gareth E. Jones[5], Pakorn Kanchanawong[1,6], **Alexander D. Bershadsky**[7] ([1]*Mechanobiology Institute, National University of Singapore*, [2]*Department of Cell and Systems Biology, University of Toronto*, [3]*CNRS UMI*, [4]*Department of Biological Sciences, National university of Singapore*, [5]*Randall Centre for Cell & Molecular Biophysics, King's College London*, [6]*Deparment of Biomedical Engineering, National University of Singapore*, [7]*Department of Molecular Cell Biology, Weizmann Institute of Science*)

2SBP-4　3D micro-environmental control around single hepatocytes to induce apico basal polarization and lumenogenesis
Virgile Viasnoff[1] ([1]*National University of Singapore*, [2]*CNRS France*)

2SBP-5　Collective cell movement driven by cellular torque generation
Takaki Yamamoto[1], Tetsuya Hiraiwa[2], **Tatsuo Shibata**[1] ([1]*RIKEN BDR*, [2]*The university of Tokyo*)

2SBP-6　多細胞の自己組織化と発生制御による in vitro での機能的な神経組織形成
Functional three-dimensional tissue formation by in vitro manipulation and multicellular autonomy
○永樂 元次（京都大学　ウイルス・再生医科学研究所）
Mototsugu Eiraku (*Institute for Frontier Life and Medical Sciences, Kyoto University*)

2SBP-7 Quantitative analysis of cellular dynamics in C. elegans embryo
Shuichi Onami (*RIKEN Center for Biosystems Dynamics Research*)

おわりに
Closing Remarks

14:00〜16:30 I 会場（一般教育棟 B 棟 4 階 B41）／Room I (B41, General Education Build. B, 4F)

2SIP 蛋白質複合体解析のアプローチ −様々な手法と実例−
Multiple Approaches for Analyses of Protein Complexes -Methods and Applications-

オーガナイザー：小川 覚之（東京大学），上久保 裕生（奈良先端科学技術大学院大学）
Organizers: Tadayuki Ogawa (The University of Tokyo), Hironari Kamikubo (NAIST)

Dramatic improvements have recently occurred in the field of protein analyses; theory, methods, measurement equipment, and computers for calculation. This symposium focuses on the analyses of protein complexes and dynamics, and introduces the multiple approaches such as MALS, AUC, MS, cryo-EM, SAXS, NMR and AFM. The combination and integration of multiple methods will permit our deeper understanding of protein complexes and dynamics.

2SIP-1 Mechanism of Protein Dynamics Revealed by the Combination of Multiple Protein Analyses in Solution
Tadayuki Ogawa, Nobutaka Hirokawa (*Grad. Sch. Med., Univ. Tokyo*)

2SIP-2 Modern analytical ultracentrifugation for quantitative studies on intermolecular interactions
Susumu Uchiyama[1,2,3] ([1]*Grad. Sch. Eng. Osaka Univ.*, [2]*ExCELLS, NINS*, [3]*IPBS, Guangdong Univ. Tech.*)

2SIP-3 高速原子間力顕微鏡で観る機能中のタンパク質動態
Watching single proteins in action using high-speed AFM
○柴田 幹大 [1,2]（[1]金沢大・WPI-NanoLSI, [2]金沢大・新学術創成）
Mikihiro Shibata[1,2] ([1]*WPI-NanoLSI, Kanazawa Univ.*, [2]*InFiniti, Kanazawa Univ.*)

2SIP-4 Structural characterization of antibody interactions in situ
Saeko Yanaka[1,2,3], Hiroki Watanabe[4], Rina Yogo[1,3], Hirokazu Yagi[3], Takayuki Uchihashi[4], Koichi Kato[1,2,3] ([1]*Inst. for Mol. Sci.*, [2]*ExCELLS*, [3]*Nagoya City Univ.*, [4]*Nagoya Univ.*)

2SIP-5 クライオ電子顕微鏡によるタンパク質複合体の構造解析
Structural Analysis of Protein Complexes by Cryo-Electron Microscopy
○包 明久, 吉川 雅英（東京大学　大学院医学系研究科）
Akihisa Tsutsumi, Masahide Kikkawa (*Graduate School of Medicine, The University of Tokyo*)

2SIP-6 連続滴定 SAXS 測定を利用した多成分混合溶液中のタンパク質の構造解析
Structural analysis of multiple-component systems using continuous titration SAXS
○上久保 裕生（奈良先端大 物資創成）
Hironari Kamikubo (*MS, NAIST*)

2SIP-7 人工タンパク質ナノブロックによる自己集合超分子複合体ナノ構造の創製と解析
Construction and analyses of self-assembling supramolecular complex nanostructures constructed from de novo protein nanobuilding blocks
○新井 亮一 [1,2]（[1]信州大・繊維・応用生物, [2]菌類微生物セ）
Ryoichi Arai[1,2] ([1]*Appl. Biol., FTST, Shinshu Univ.*, [2]*CFMD, Shinshu Univ.*)

おわりに
Closing Remarks

3 日目（9 月 17 日（月・祝））／Day 3（Sep. 17 Mon. Pub holiday）

9:00〜11:30　A 会場（一般教育棟 B 棟 1 階 B11）／Room A (B11, General Education Build. B, 1F)
3SAA　光回復酵素／クリプトクロムスーパーファミリーの光依存的機能と多様性の最先端
Cutting edge of diversity and light-dependent function of photolyase/cryptochrome superfamily

オーガナイザー：山元 淳平（大阪大学），山田 大智（名古屋工業大学）
Organizers: Junpei Yamamoto (Osaka University), Daichi Yamada (Nagoya Institute of Technology)

Photolyase/cryptochrome superfamily (PCSf) functions as regulatory proteins in maintenance of genome stability, signal transduction, and circadian clock. Although their biological functions are diverse, they share common protein fold with high similarity in amino acid sequence and light-harnessing center, flavin adenine dinucleotide (FAD). How does PCSf acquire distinct functions with the same structure? In this symposium, we will focus on the diversity and light-dependent function of respective proteins in PCSf, and will try to look for the molecular origin of diversity of PCSf.

はじめに
Opening Remarks

3SAA-1　DNA binding and light-dependent DNA repair abilities of photolyases
Junpei Yamamoto (*Grad. Sch. Eng. Sci., Osaka Univ.*)

3SAA-2　Differences and similarities in (6-4) photolyase DNA repair pathways
Hisham Dokainish[1], Daichi Yamada[2], Hideki Kandori[2], Akio Kitao[3] ([1]*Theoretical Molecular Science Laboratory, Riken*, [2]*Nagoya Institute of Technology*, [3]*Tokyo Institute of Technology*)

3SAA-3　The undistorted photolyase: photoreduction stages revealed via serial femtosecond crystallography
Manuel Maestre-Reyna (*Inst. Biol. Chem., Academia Sinica*)

3SAA-4　Light-induced electron (and proton) transfer underlying the activation of cryptochromes and photolyases
Pavel Müller (*CNRS/I2BC*)

3SAA-5　光回復酵素/クリプトクロムスーパーファミリーの機能転換研究
Functional conversion of photolyases/cryptochrome superfamily (PCSf): Toward finding the ancestor of PCSf
○山田 大智（名工大・院工）
Daichi Yamada (*Nagoya Inst. Tech.*)

おわりに
Closing Remarks

9:00〜11:30　B 会場（一般教育棟 A 棟 2 階 A21）／Room B (A21, General Education Build. A, 2F)

3SBA　文部科学省科学研究費補助金 新学術領域研究「宇宙からひも解く新たな生命制御機構の統合的理解：重力変化を含む力学的ストレスに対するメカノセンシング機構」共催
物理的力と生物
Physical force in the life

オーガナイザー：成瀬 恵治（岡山大学），東谷 篤志（東北大学）
Organizers: Keiji Naruse (Okayama University), Atsushi Higashitani (Tohoku University)

Maintenance and destruction of homeostasis play key roles in biological adaptation to extreme environments such as space. Integrated understanding of the adaptation mechanism at a molecular, cellular, and human level opens the new bioscience field. We invite the front runners of this field to this symposium and discuss the future of this field.

はじめに
Opening Remarks

3SBA-1　高圧力で誘起される細胞運動
Pressure-induced activation of the cell motility
○西山 雅祥（近畿大）
Masayoshi Nishiyama (*Kindai Univ.*)

3SBA-2　心筋細胞伸展感受性のマクロ・ミクロ連関
Macro-micro linkages in cardiac response to stretch
○入部 玄太郎（岡山大学医歯薬学総合研究科）
Gentaro Iribe (*Grad. Sch. Med. Dent. Pharm., Univ. Okayama*)

3SBA-3　Combined effects of microgravity and UVB radiation on plant
Jun Hidema[1], Akihisa Takahashi[2] ([1]*Grad. Sch. Life Sci., Tohoku Univ.*, [2]*Gunma Univ., Heavy Ion Med. Center*)

3SBA-4　線虫の物理的力に対する応答
Response to physical force in *C. elegans*
○東谷 篤志（東北大・院・生命科学）
Atsushi Higashitani (*Grad Schl Life Sci. Tohoku Univ.*)

3SBA-5　骨格筋維持における重力の役割―ゼブラフィッシュの宇宙滞在から学ぶこと
Roles of the gravity in the maintenance of skeletal muscle—what we can learn from space stay of zebrafish
○瀬原 淳子（京都大学）
Atsuko Sehara (*Institute for Frontier Life and Medical Sciences, Kyoto University, Japan*)

おわりに
Closing Remarks

9:00〜11:30　D 会場（一般教育棟 A 棟 3 階 A36）／Room D (A36, General Education Build. A, 3F)

3SDA　JST CREST「ライフサイエンスの革新を目指した構造生命科学と先端的基盤技術」領域 共催
構造生命科学の新展開
New horizon of Structural Life Science

オーガナイザー：中川 敦史（大阪大学），清水 敏之（東京大学）
Organizers: Atsushi Nakagawa (Osaka University), Shimizu Toshiyuki (The University of Tokyo)

"Structural life science" aims to integrate cutting-edge life science areas with structural biology for innovation in life science. In this symposium, young top scientists who are opening up this field will be invited to present their recent results and novel techniques to facilitate thier researches. This symposium is prgrammed to initiate the discussion on the future development of structural life sciences.

3SDA-1　筋小胞体カルシウム ATP アーゼ SERCA2b の膜貫通ヘリックス相互作用による制御機構の構造基盤
Structural basis of Sarco/Endoplasmic reticulum Ca2+-ATPase 2b regulation via transmembrane helix interplay

○井上 道雄[1], 作田 菜奈美[1], 渡部 聡[1], 田中 良樹[2], 潮田 亮[3], 加藤 幸成[4], 高木 淳一[5], 塚崎 智也[2], 永田 和宏[3], 稲葉 謙次[1]（[1]東北大・多元研, [2]奈良先端大・バイオ, [3]京産大・総合生命, [4]東北大・医, [5]阪大・蛋白研）
Michio Inoue[1], Nanami Sakuta[1], Satoshi Watanabe[1], Yoshiki Tanaka[2], Ryo Ushioda[3], Yukinari Kato[4], Junichi Takagi[5], Tomoya Tsukazaki[2], Kazuhiro Nagata[3], Kenji Inaba[1] ([1]*IMRAM, Tohoku Univ*, [2]*Grad. Sch. Biol. Sci., NAIST*, [3]*Fac. of Life Sci., KSU*, [4]*Med., Tohoku Univ.*, [5]*IPR, Osaka Univ.*)

3SDA-2　循環型電子伝達に関わる NDH-1 複合体の構造および相互作用解析
Structure and interaction studies on the cyanobacterial NDH-1 complex involved in the photosynthetic cyclic electron flow

○田中 秀明[1], 梅野 恵太[1], 三角 裕子[1], 金 宙妍[1], レグナー マティアス[2], 池上 貴久[3], ノヴァチク マーク[2], 栗栖 源嗣[1]（[1]阪大蛋白研, [2]Ruhr University Bochum, [3]横市大・生命医科学）
Hideaki Tanaka[1], Keita Umeno[1], Yuko Misumi[1], Ju Yaen Kim[1], Matthias Rögner[2], Takahisa Ikegami[3], Marc Nowaczyk[2], Genji Kurisu[1] ([1]*IPR, Osaka Univ.*, [2]*Ruhr University Bochum*, [3]*Grad. Sch. of Medical Life Science, Yokohama City Univ.*)

3SDA-3　てんかん関連リガンド-受容体複合体 LGI1-ADAM22 の構造基盤
Structural basis of epilepsy-related ligand-receptor complex LGI1-ADAM22

○山形 敦史[1], 宮崎 裕理[2], 重松 秀樹[3], 白水 美香子[3], 深田 優子[2], 深田 正紀[2], 深井 周也[1]（[1]東京大学・定量生命科学研究所・蛋白質複合体解析研究分野, [2]自然科学研究機構・生理学研究所・生体膜研究部門, [3]理研・生命機能科学研究センター）
Atsushi Yamagata[1], Yuri Miyazaki[2], Hideki Shigematsu[3], Mikako Shirouzu[3], Yuko Fukata[2], Masaki Fukata[2], Shuya Fukai[1] ([1]*Institute for Quantitative Biosciences, Univ. of Tokyo*, [2]*Div. of Membrane Physiology, NIPS*, [3]*RIKEN Center for Biosystems Dynamics Research*)

3SDA-4　電位依存性ホスファターゼ VSP の構造生物学的研究
Structural analysis of voltage-sensing phosphatase (VSP) on the electrochemical coupling

○成田 宏隆[1], 松田 真[2], 岡村 康司[3], 中川 敦史[2]（[1]名工大, [2]阪大・蛋白研, [3]阪大・院医）
Hirotaka Narita[1], Makoto Matsuda[2], Yasushi Okamura[3], Atsushi Nakagawa[2] ([1]*Nagoya Inst. Tech.*, [2]*Inst. Protein Res., Osaka Univ.*, [3]*Gra. Sch. of Med., Osaka Univ.*)

3SDA-5　[NiFe]ヒドロゲナーゼがもつ鉄硫黄クラスターの新規機能
Novel functions of the Fe-S clusters in the [NiFe]-hydrogenases
○庄村 康人（茨城大・院理工）
Yasuhito Shomura (*Grad. Sch. Sci. and Eng., Ibaraki Univ.*)

3SDA-6　Toll 様受容体の構造生物学
Structural biology of Toll-like receptors
○大戸 梅治, 清水 敏之（東京大学大学院薬学系研究科）
Umeharu Ohto, Toshiyuki Shimizu (*Graduate School of Pharmaceutical Sciences, The University of Tokyo*)

9:00～11:30　E 会場（一般教育棟 A 棟 3 階 A37）／Room E (A37, General Education Build. A, 3F)

3SEA　化学感覚の新コンセプト
Novel concepts of chemical senses

オーガナイザー：今井 啓雄（京都大学），山下 敦子（岡山大学）
Organizers: Hiroo Imai (Kyoto University), Atsuko Yamashita (Okayama University)

Recent elucidation of molecular mechanisms of chemical senses allows us to integrate the biophysical points of views: structure, function, evolution, and neural network for taste and olfaction. In this symposium, we will introduce the examples of integrative studies on chemical senses for various environmental signals. These studies would give novel concepts of chemical signals and stimulate further studies and discussions for the biophysical understanding of chemical senses.

3SEA-1　Taste perception approached by biophysics and structural biology
Atsuko Yamashita (*Grad. Sch. Med. Dent. & Pharm. Sci., Okayama University*)

3SEA-2　甘味受容体のアゴニスト/アンタゴニスト特性
Agonistic/antagonist properties of sweet taste receptor
○實松 敬介[1,2], 重村 憲徳[1,2], 二ノ宮 裕三[1,2,3]（[1]九大院 歯 口腔機能, [2]九大 味嗅覚センサ 感覚生理, [3]モネル研）
Keisuke Sanematsu[1,2], Noriatsu Shigemura[1,2], Yuzo Ninomiya[1,2,3] ([1]*Sect. Oral Neurosci., Grad.Sch. of Dent. Sci., Kyushu Univ.*, [2]*Div. Sensory Physiol. R & D TAOS, Kyushu Univ.*, [3]*Monell Chem. Senses Ctr.*)

3SEA-3　霊長類味覚受容体の機能多様性
Functional diversities of primate taste receptors
○今井 啓雄（京都大・霊長研）
Hiroo Imai (*Primate Research Institute, Kyoto University*)

3SEA-4　Taste cells lacking synapses open a wide pore channel for rapid neurotransmission of tastes
Akiyuki Taruno (*Dept. Mol. Cell Physiol., Kyoto Pref. Univ. Med.*)

3SEA-5 光遺伝子操作による単一の糸球体の活性により誘因される恐怖行動の探索
Immobility responses are induced by photoactivation of single glomerular species responsive to fox odour TMT

○斎藤 治美[1,2,3], 西住 裕文[2,3], 鈴木 悟[3], 松本 英之[4], 家城 直[4], 阿部 拓哉[5], 清成 寛[5,6], 横田 秀夫[7], 森田 正彦[7], 平山 望[8], 菊水 健史[8], 森 憲作[4], 坂野 仁[2,3]（[1]玉川大学脳科学研究所, [2]福井大学医学部高次機能領域, [3]東京大学理学研究科生化学専攻, [4]東京大学医学研究科細胞分子生理学教室, [5]理研ライブサイエンス技術基盤研究センター, [6]理研生命機能科学研究センター生体モデル開発ユニット, [7]理化学研究所 光量子工学研究センター 画像情報処理研究チーム, [8]麻布大学 獣医学部伴侶動物学教室）

Harumi Saito[1,2,3], Hirofumi Nishizumi[2,3], Satoshi Suzuki[3], Hideyuki Matsumoto[4], Nao Ieki[4], Takaya Abe[5], Hiroshi Kiyonari[5,6], Masahiko Morita[7], Masahiko Morita[7], Nozomi Hirayama[8], Takefumi Kikusui[8], Kensaku Mori[4], Hitoshi Sakano[2,3] ([1]*Brain Science Institute, Tamagawa University*, [2]*Department of Brain Function, Faculty of Medical Sciences, University of Fukui*, [3]*Department of Biological Sciences, Graduate School of Science, The University of Tokyo*, [4]*Department of Physiology, Cellular and Molecular Physiology, Graduate School of Medicine, The University of Tokyo*, [5]*Genetic Engineering Team, RIKEN, Center for Life Science, Technologies*, [6]*Animal Resource Development Unit, RIKEN, Center for Life Science Technologies*, [7]*Image Processing Research Team, RIKEN,*, [8]*Department of Animal Science and Biotechnology, School of Veterinary, Medicine, Azabu University*)

3SEA-6 Male glandular odorants evoke female attractive behavior among ring-tailed lemurs (*Lemur catta*): A putative pheromone in primates

Mika Shirasu[1,2] ([1]*Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Sciences,*, [2]*ERATO Touhara Chemosensory Signal Project*)

9:00～11:30　F 会場（一般教育棟 B 棟 3 階 B32）／Room F (B32, General Education Build. B, 3F)

3SFA　文部科学省科学研究費補助金 新学術領域研究「シンギュラリティ生物学」共催 シンギュラリティ生物学
Singurality biology

オーガナイザー：永井 健治（大阪大学），堀川 一樹（徳島大学）
Organizers: Takeharu Nagai (Osaka University), Kazuki Horikawa (Tokushima University)

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 minor element in cellular population would sometimes work as a key for causing singularity, at which living system is significantly and drastically changed to different status. In this symposium, we would like to discuss analytical methods for sensitive detection or visualization as well as the theories regarding principle or mechanism how such minor elements give rize to the singularity-associated phenomena.

はじめに
Opening Remarks

3SFA-1 シンギュラリティ生物学による神経変性疾患へのアプローチ
Approach to neurodegenerative disease by singularity biology

○坂内 博子[1,2], 金谷 美沙[3], 前田 純宏[4], 廣瀬 松美[2], 高島 明彦[3], 御子柴 克彦[2]（[1]JST・さきがけ, [2]理研・脳センター, [3]学習院大・理, [4]慶應大・医）

Hiroko Bannai[1,2], Misa Kanatani[3], Sumihiro Maeda[4], Matsumi Hirose[2], Akihiko Takashima[3], Katsuhiko Mikoshiba[2] ([1]*JST PRESTO*, [2]*RIKEN CBS*, [3]*Gakushuin Univ, Faculty. Sci.*, [4]*Keio Univ. Sch. Med.*)

3SFA-2　シンギュラリティ生物学を定量する情報理論的アプローチ
Information theoretic approach to quantify singularity in biology
○小松崎 民樹 [1,2]（[1]北海道大学 電子科学研究所, [2]リヨン高等師範学校）
Tamiki Komatsuzaki[1,2] ([1]*Hokkaido Univ. RIES MSC*, [2]*ENS de Lyon*)

3SFA-3　シンギュラリティ細胞を探索する技術：散乱光を使った非染色細胞状態計測
A Challenges to use scattering lights for singularity biology
○渡邉 朋信（理化学研究所・生命機能）
Tomonobu M. Watanabe (*RIKEN, BDR*)

3SFA-4　シンギュラリティ生物学へ向けて：１細胞の観察・分取とそのシークエンシング解析
An automated system of single cell picking and sequencing for singularity biology
○城口 克之 [1,2,3]（[1]理研・生命機能セ, [2]理研・生命医セ, [3]JST さきがけ）
Katsuyuki Shiroguchi[1,2,3] ([1]*RIKEN BDR*, [2]*RIKEN IMS*, [3]*JST PRESTO*)

3SFA-5　高速・高拡張性全脳イメージングシステム FAST：アンバイアスで仮説フリーに脳内のシンギュラリティを検出する手法へ
High-speed and scalable whole-brain imaging system FAST: unbiased and hypothesis-free approach to detect singularity in the brain
○橋本 均 [1,2,3,4], 笠井 淳司 [1], 勢力 薫 [1,5], 中澤 敬信 [1,6]（[1]大阪大学大学院薬学研究科神経薬理学分野, [2]連合小児発達学研究科附属子どものこころの発達研究センター, [3]データビリティフロンティア機構バイオサイエンス部門, [4]先導的学際研究機構超次元ライフイメージング研究部門, [5]大阪大学未来戦略機構, [6]大阪大学大学院歯学研究科薬理学教室）
Hitoshi Hashimoto[1,2,3,4], Atsushi Kasai[1], Kaoru Seiriki[1,5], Takanobu Nakazawa[1,6] ([1]*Lab. of Mol. Neuropharmacol., Grad. Sch. of Pharmaceutical Sci., Osaka Univ.*, [2]*Center for Child Mental Dev., United Grad. Sch. of Child Dev.*, [3]*Div. of Biosci., Inst. for Datability Sci.*, [4]*Dep. of Transdimensional Life Imaging, Open and Transdisciplinary Res. Initiatives*, [5]*Inst. for Academic Initiatives, Osaka Univ.*, [6]*Dep. of Pharmacology, Grad. Sch. of Dentistry, Osaka Univ.*)

3SFA-6　シンギュラリティ生物学による自己免疫疾患制御機構の解明
Singularity cell research in autoimmunity
○岡崎 拓（徳島大学先端酵素学研究所免疫制御学分野）
Taku Okazaki (*Div. Immun. Reg., Inst. Adv. Med. Sci., Tokushima U.*)

おわりに
Closing Remarks

9:00～11:30　G 会場（一般教育棟 B 棟 3 階 B33）／Room G (B33, General Education Build. B, 3F)
3SGA　生体分子の運動と機能理解を目指した単粒子観測実験と計算解析
Single Particle Analysis of Biological Molecules to Study Dynamics and Functions

オーガナイザー：宮下 治（理化学研究所），岩崎 憲治（大阪大学）
Organizers: Osamu Miyashita (RIKEN), Kenji Iwasaki (Osaka University)

Biological molecules perform their functions through dynamical transitions and molecular interactions, and thus, we need to study not only their static structures but also their conformational transitions. For this purpose, information from biomolecular “single particles”, i.e., non-averaged information of molecular conformations, is critically important. In this symposium, various experimental techniques to obtain such information – spectroscopy, cryo-EM, AFM, XFEL – as well as theoretical and computational studies to take advantage of such experimental data for obtaining further information will be discussed.

3SGA-1 Single molecule fluorescence tracking at 10-μs resolution: Application to protein folding and functional dynamics
Satoshi Takahashi, Hiroyuki Oikawa (*IMRAM, Tohoku Univ.*)

3SGA-2 蛋白質の複雑なコンフォメーション変化の解明を目指して-ハイブリッドアプローチ
Toward the elucidation of complicated conformational change in proteins by using a hybrid approach
○岩崎 憲治 [1], 松本 淳 [2], 川口 敦史 [3]（[1]阪大・蛋白研, [2]量子科学技術研究開発機構, [3]筑波大・人間総合科学）
Kenji Iwasaki[1], Atsushi Matsumoto[2], Atsushi Kawaguchi[3] ([1]*IPR, Osaka Univ.*, [2]*QST*, [3]*Grad. Sch. Comprehensive Human Sciences, Univ. of Tsukuba*)

3SGA-3 一分子ダイナミクス理解のための高速 AFM データの画像処理と定量解析
Image Processing and Quantitative Analysis of High-Speed AFM data for studying single-molecule dynamic
○内橋 貴之（名古屋大学大学院理学研究科）
Takayuki Uchihashi (*Department of Physics, Nagoya University*)

3SGA-4 Controlled Environment Nano-Imaging Free From Radiation Damage by X-ray Laser Diffraction
Yoshinori Nishino[1], Takashi Kimura[1], Akihiro Suzuki[1], Yasumasa Joti[2], Yoshitaka Bessho[3] ([1]*RIES, Hokkaido Univ.*, [2]*JASRI*, [3]*Inst. Bio. Chem., Academia Sinica*)

3SGA-5 Temporal hierarchy in the energy landscape of adenylate kinase folding/unfolding
J. Nicholas Taylor (*Research Institute for Electronic Science, Hokkaido University*)

3SGA-6 Hybrid modeling approaches to study structures and dynamics of biological systems
Florence Tama[1,2] ([1]*Nagoya University*, [2]*RIKEN*)

9:00～11:30　H 会場（一般教育棟 A 棟 4 階 A41）／Room H (A41, General Education Build. A, 4F)

3SHA 文部科学省科学研究費補助金 新学術領域研究「光合成分子機構の学理解明と時空間制御による革新的光ー物質変換系の創製」共催
光エネルギー変換の生物物理：光合成のメカニズムはどこまで解明されたか？
Biophysics of light-energy conversion: To what extent has the mechanism of photosynthesis been clarified?

オーガナイザー：菅 倫寛（岡山大学），野口 巧（名古屋大学）
Organizers: Michi Suga (Okayama University), Takumi Noguchi (Nagoya University)

Photosynthesis is an elaborate biological system for light-energy conversion. It not only provides an energy source for biological activities but also sustains life on earth by O_2 evolution. Although recent high-resolution structures of photosynthetic proteins have significantly advanced the photosynthesis researches, many unsolved problems still remain in the mechanism of light-energy conversion. In this symposium, we will introduce state-of-art researches with theoretical and experimental biophysical approaches to unravel the photosynthetic mechanism and discuss the future perspectives in this field.

はじめに
Opening Remarks

3SHA-1 Intramolecular vibrations complement robustness of the primary charge separation in Photosystem II reaction center
Akihito Ishizaki (*Institute for Molecular Science*)

3SHA-2 極低温顕微分光による光化学系複合体の単一分子分光
Single Molecule Spectroscopy of Photosystem Complex by Cryomicroscopy
○柴田 穣（東北大院理・化学）
Yutaka Shibata (*Tohoku Univ. Chemistry*)

3SHA-3 Crystal structure of PSII in the intermediate states and possible mechanism for the O=O bond formation
Michi Suga, Jian-Ren Shen (*Research Institute for Interdisciplinary Science*)

3SHA-4 光合成初期反応の電子スピン画像解析
Electron Spin Polarization Imaging Analyses of Primary Charge Separations in Photosynthesis
○小堀 康博[1,2], 長嶋 宏樹[1], 見延 玲奈[2], 長谷川 将司[2], 三野 広幸[3], Norris James[4]（[1]神戸大分子フォト, [2]神戸大院理, [3]名大院理, [4]シカゴ大化）
Yasuhiro Kobori[1,2], Hiroki Nagashima[1], Reina Minobe[2], Masashi Hasegawa[2], Hiroyuki Mino[3], James Norris[4] ([1]*Molecular Photoscience Research Center, Kobe Univ.*, [2]*Graduate School of Science, Kobe Univ.*, [3]*Graduate School of Science, Nagoya Univ.*, [4]*Dep. Chem. Univ. of Chicago*)

3SHA-5 光化学系 II における水分解酸素発生反応の分子機構
Molecular mechanism of the water-splitting and oxygen-evolving reaction in photosystem II
○斉藤 圭亮（東京大学 先端科学技術研究センター）
Keisuke Saito (*RCAST, Univ. Tokyo*)

3SHA-6 光合成光エネルギー変換におけるプロトン共役電子移動の赤外分光解析
Infrared analyses of proton-coupled electron transfer in photosynthetic light-energy conversion
○野口 巧（名大・理）
Takumi Noguchi (*Grad. Sch. Sci., Nagoya Univ.*)

おわりに
Closing Remarks

9:00〜11:30　I 会場（一般教育棟 B 棟 4 階 B41）／Room I (B41, General Education Build. B, 4F)
3SIA　東アジアシンポジウム：１分子生物物理学の最前線
East Asian symposium: Frontiers of single-molecule biophysics

オーガナイザー：佐甲 靖志（理化学研究所），Ming Li（Chinese Academy of Sciences），Jie Yan（National University of Singapore），Tae-Young Yoon（Seoul University）
Organizers: Yasushi Sako (RIKEN), Ming Li (Chinese Academy of Sciences), Jie Yan (National University of Singapore), Tae-Young Yoon (Seoul University)

Single molecule imaging and manipulation has been a powerful toolkit for elucidating many biological phenomena. These include the biological function, mechanics, intermolecular interactions, and dynamics of proteins and nucleic acids. Recently, the field of single molecule biophysics heralds spectacular technical breakthroughs, such as improvement of spatial and temporal resolution and development of optics for investigating complicated biological processes in living cells. This symposium provides a forum for the world-leading East Asian scientists to share recent advances in field of single molecule biophysics, and discuss future applications in both academic and medical settings.

はじめに
Opening Remarks

3SIA-1 Watching single proteins dancing at biological membranes
Ming Li (*The Institute of Physics, Chinese Academy of Sciences*)

3SIA-2　1 分子イメージングを用いた GPCR の薬理学に向けて
Toward single-molecule imaging-based pharmacology of G protein-coupled receptors
○柳川 正隆（理研・細胞情報）
Masataka Yanagawa (*Cell. Info. Lab., Riken*)

3SIA-3　Biophysics of intercellular nanotube
Minhyeok Chang[1], Jaeho Oh[1], **Jong-Bong Lee**[1,2] ([1]*Department of Physics, POSTECH*, [2]*Department of Interdisciplinary Bioscience & Bioengineering, POSTECH*)

3SIA-4　Resolving nano-architectural dynamics of molecular assembly in living cells with emission dipole orientation imaging
Tomomi Tani (*Marine Biological Laboratory, Woods Hole*)

3SIA-5　Single-Molecule fluorescence studies on cotranscriptional folding and intrinsic termination Dynamics
Sungchul Hohng (*Department of Physics and Astronomy, Institute of Applied Physics, and National Center of Creative Research Initiatives, Seoul National University*)

3SIA-6　Single-molecule mechanical (un)folding of RNA: Unravelling mRNA structure's role in translational regulation
Gang Chen (*Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University*)

3SIA-7　Studies on the dynamics and regulation of 30-nm chromatin fiber by single molecule force spectroscopy
Wei Li[1], Ping Chen[2], Ming Li[1], Guohong Li[2] ([1]*National Laboratory for Condensed Matter Physics and Key Laboratory of Soft Matter Physics, Institute of Physics, Chinese Academy of Sciences*, [2]*National Laboratory of Biomacromolecules, CAS Center for Excellence in Biomacromolecules, Institute of Biophysics, Chinese Academy of Sciences*)

3SIA-8　Mechanical lifetime of biomolecules under physiological forces
Shiwen Guo[1], Qingnan Tang[2], **Jie Yan**[1,2] ([1]*Mechanobiology Institute, National University of Singapore*, [2]*Department of Physics, Faculty of Science, National University of Singapore*)

9:00〜11:30　K 会場（一般教育棟 E 棟 1 階 E11）／Room K (E11, General Education Build. E, 1F)

3SKA　細菌すごいぜ！―バクテリアを通して見る生命現象―
From the elephant to *E. coli*- is it all the same?

オーガナイザー：中根 大介（学習院大学），小嶋 誠司（名古屋大学）
Organizers: Daisuke Nakane (Gakushuin University), Seiji Kojima (Nagoya University)

"Anything found to be true of *E. coli* must also be true of elephants." It is a slogan of the early days of molecular biology. On the aspect of cell biology, bacterial life systems are partially common but something 'eccentric' from the higher organisms. In this symposium, we will focus on the energy and information through the bacterial cell surface, and introduce you the latest findings on the life at the small size.

はじめに
Opening Remarks

3SKA-1 小さなスパイダーマン： 糸をひっぱるバクテリア
Tiny Spider-Man: Bacteria pulling fibers
○中根 大介, 西坂 崇之（学習院大・物理）
Daisuke Nakane, Takayuki Nishizaka (*Dept. Phys., Gakushuin Univ.*)

3SKA-2 生命の根幹の理解に向けた ミニマムゲノム細菌における CRISPRi の開発
Toward understanding of the Fundamentals of Life: minimal bacterium and inducible CRISPRi
○柿澤 茂行 [1,2]（[1]ベンター研・合成生物学, [2]産総研・生物プロセス）
Shigeyuki Kakizawa[1,2] ([1]*JCVI, Synthetic Biology&Bioenergy*, [2]*AIST, Bioprocess*)

3SKA-3 To use light or to avoid it? Light-adaptation strategies in marine bacteria
Susumu Yoshizawa[1,2] ([1]*AORI, UTokyo*, [2]*Grad. Sch. Front. Sci., UTokyo*)

3SKA-4 Investigating the Unique Swimming Style of *Campylobacter jejuni*
Eli J. Cohen, Morgan Beeby (*Department of Life Sciences, Imperial College London*)

3SKA-5 The second messenger signaling drives chromosome replication in the asymmetrically dividing bacterium *Caulobacter crescentus*
Shogo Ozaki[1,2], Christian Lori[1], Urs Jenal[1] ([1]*Biozentrum, University of Basel*, [2]*Kyushu University*)

3SKA-6 Bacterial surface motility and biofilm formation in motile and non-motile bacteria
Andrew Utada (*U of Tsukuba*)

おわりに
Closing Remarks

9:00〜11:30　M 会場（一般教育棟 E 棟 2 階 E21）／Room M (E21, General Education Build. E, 2F)

3SMA　微生物における生命金属動態とその利用
"Metallodynamics" in Microorganisms and its Various Applications

オーガナイザー：古川 良明（慶應義塾大学），當舎 武彦（理化学研究所）
Organizers: Yoshiaki Furukawa (Keio University), Takehiko Tosha (RIKEN)

In order to survive under various conditions, microorganisms have developed biological systems utilizing metal ions. Besides, microorganisms are often equipped with unprecedented metalloproteins that can perform very specific reactions. In this symposium, we will review recent advances in our understandings on the metal-related processes in microorganisms such as the metal acquisition and the functions of metalloproteins. Together with the application of those metal-related processes to engineering use, furthermore, dynamics of metal ions (or “metallodynamics”) in microorganisms will be discussed.

はじめに
Opening Remarks

3SMA-1 *Corynebacterium glutamicum* によるヘム取り込み反応の構造基盤
Structural Basis for Heme Uptake Reaction in *Corynebacterium glutamicum*
○青野 重利 [1,2]（[1]自然機構・生命創成センター, [2]自然機構・分子研）
Shigetoshi Aono[1,2] ([1]*NINS, ExCELLS*, [2]*NINS, IMS*)

3SMA-2 **anammox 反応を担う金属タンパク質**
Metalloproteins responsible for anammox reaction
○平 大輔（崇城大・生物生命）
Daisuke Hira (*Fac. of Biotech. and Life Sci., Sojo Univ.*)

3SMA-3 **脱窒にみられる金属タンパク質複合体による効率的な連続化学反応**
Effective consecutive chemical reactions catalyzed by metalloprotein complex in denitrification
○當舎 武彦（理研・播磨）
Takehiko Tosha (*RIKEN SPring-8*)

3SMA-4 **スーパーオキシドディスムターゼを通じたバクテリアにおける銅イオン動態の理解**
A mechanism on copper acquisition of bacterial Cu/Zn-superoxide dismutase
○古川 良明（慶應大・理工）
Yoshiaki Furukawa (*Dept. of Chem., Keio Univ.*)

3SMA-5 **硫酸性環境に生息する単細胞性紅藻を利用した貴金属回収**
Study on the effective and selective recovery of precious metal ions using a sulfo-thermophilic red alga, Galdieria sulphuraria
○蓑田 歩（筑波大学 生命環境系 環境バイオマス共生学専攻）
Ayumi Minoda (*Fac. of Life and Environ. Sci., Univ. of Tsukuba*)

3SMA-6 **微生物による金属腐食**
Metal corrosion by microorganisms
○若井 暁（神戸大院・科技イノベ）
Satoshi Wakai (*Grad. Sch. Sci. Tech. Innov., Kobe Univ.*)