## CONTENTS 2009

SPring-8 Research Frontiers 2009

Preface	7
Scientific Frontiers	9
<b>A PLACE IN THE "X-RAY" SUN</b> – On the Cutting Edge	10
LIFE SCIENCE: STRUCTURAL BIOLOGY	16
Crystal Structure of the Sodium-Potassium Pump and Its Regulation by Cardiac Glycosides C. Toyoshima and H. Ogawa	18
Structure of the Connexin 26 Gap Junction Channel at 3.5 Å Resolution S. Maeda and T. Tsukihara	···· 20
Location and Function of Chloride Ions in Oxygen-Evolving Photosystem II Revealed by X-ray Crystallography JR. Sherv	22
Mechanism of Hormone and Effector Recognition by the Gibberellin Receptor Y. Hirano, K. Murase and T. Hakoshima	···· 24
Structural Basis for Gibberellin Recognition by Its Receptor GID1	26
Structure of Rat Liver Vault at 3.5 Å Resolution K. Kato, H. Tanaka and T. Tsukihara	28
Conformational Transition of Sec Machinery Inferred from Bacterial SecYE Structures	30
Crystallographic Study of the Conserved N-Terminal Domain of the Peroxisomal Matrix-Protein-Import Receptor, Pex14p J. R. Su, K. Takeda and K. Miki	···· 32
Insights into the Stator Assembly of the Na <sup>+</sup> -Driven <i>Vibrio</i> Flagellar Motor from the Crystal Structure of MotY S. Kojíma, M. Homma and K. Imada	34
Stator Assembly and Activation Mechanism of the Flagellar Motor Revealed by the Crystal Structure of the Periplasmic Region of MotB S. Kojima, K. Imada and K. Namba	36
LIFE SCIENCE: MEDICAL BIOLOGY	•• 38
Inner Structure of Cretaceous Fossil Flower Revealed by X-Ray Microtomography	···· 40
Revealing Human Brain Circuits by Microtomography R. Mizutani	···· 42
X-Ray Phase-Contrast Microtomography for Visualizing of Renal Microstructures in Albino-Panda-Albino Hamsters J. Wu, T. Takeda and A. Momose	···· 44

Three-Dimensional Visualization of a Human Chromosome Using Coherent X-Ray Diffraction K. Maeshima and Y. Nishino	
Compact Packing of Lipocalin-Type Prostaglandin D Synthase Induced by Binding of Lipophilic Ligands <i>T. Inui and K. Inoue</i>	
Actin Molecule Becomes a Flat Conformation by Polymerization	
MATERIALS SCIENCE: STRUCTURE ······	52
Electronic and Magnetic Structures of Spin-Orbit Coupling Induced Mott Insulator Sr <sub>2</sub> IrO <sub>4</sub> H. Ohsumí, T. Aríma and H. Takagí	
Tetragonal-Orthorhombic Phase Transition in LaFeAsO – Relevant to High-Temperature Superconductivity T. Nomura and H. Hosono	
Fulleride Superconductors are Three-Dimensional Members of the High-T <sub>c</sub> Family	
Entry of Novel π-Conjugated Molecules into Liquid Crystalline Materials	
Analyses on Crystalline Structures of Carbon Nanowalls by Grazing-Incidence X-Ray Diffraction Using Synchrotron Light Source W. Takeuchí, H. Kondo and M. Horí	
Nature of Structural Transformations in the B <sub>2</sub> O <sub>3</sub> Glass under High Pressure	
X-Ray Diffractometry for the Structure Determination of a Submicrometer-Scale Single Powder Grain S. Kimura	
Angular Anomaly in the Dynamic Structure Factor of Graphite Close to Bragg Reflections R. Hambach, C. Giorgetti, N. Hiraoka and L. Reining	
MATERIALS SCIENCE: ELECTRONIC & MAGNETIC PROPERTIES	
Looking Deeper into Buried Nanolayers and Complex Materials: Standing-Wave and Angle-Resolved Hard X-Ray Photoemission C. S. Fadley, S. Ueda and K. Kobayashi	
Definitive Evidence for Fully Occupied 4 <i>f</i> Electrons in YbS and Yb Metal	
Fermi Surface Variation Near Quantum Critical Point of $\text{CeRu}_2(\text{Si}_{1-x}\text{Ge}_x)_2$ Studied by Resonant ARPES <i>T. Okane</i>	
Dependence of Electronic Properties of Epitaxial Few-Layer Graphene	
Transverse Acoustic Excitations in Simple Liquid S. Hosokawa, M. Inuí and Alfred Q. R. Baron	

Metal-Insulator Transitions in Complex Oxides Probed by High Resolution X-Ray Compton Scattering B. Barbíellíní, A. Koízumí and M. Itou	82
Energy Domain Mössbauer Spectroscopy Using Synchrotron Radiation	84
High-Magnetic-Field XMCD Using Pulsed Magnet Y. H. Matsuda	86
	88
Molecular-Frame Photoelectron Angular Distributions of Gas-Phase Molecules	90
Inhomogeneity of Liquid Water – Two Structural Motifs T. Tokushima, Y. Harada, S. Shin and A. Nilsson	92
Identification of Valence Electronic States of Aqueous Acetic Acid in Acid-Base Equilibrium Using Site-Selective X-Ray Emission Spectroscopy Y. Horíkawa, T. Tokushíma and S. Shín	94
Small-Angle X-Ray Scattering from Drug Delivering Nanoparticles in Solutions: Pharmacological Efficiency and Particle-Inner Structures K. Sakuraí	96
Evaluation of Structural Relationship in Hybridized Porous Coordination Polymer Crystals K. Híraí, S. Furukawa, O. Sakata and S. Kítagawa	98
AgI Nanoparticles : Size-Controlled Stabilization of Superionic Phase	.00
Synchrotron X-Ray Diffraction Study of Fe-1111 Type Superconductor $1$ AeFeAsF (Ae = Ca and Sr): Possibility of Higher $T_c$ S. Matsuíshí and H. Hosono	.02
Comprehensive Structural Study of Glassy BaTi $_2O_5$ 1 J. Yu, S. Kohara and A. Masuno	.04
A Novel Form of Topologically Ordered Amorphous Silica obtained	.06
EARTH & PLANETARY SCIENCE ······1	.08
Phase Relations of Iron-Nickel Alloys at Multimegabar Pressure:	.10
Elasticity of MgO to 130 GPa: Implications for Lower Mantle Mineralogy 1 M. Murakami	.12
Mineralogy of the Lower Mantle Investigated Using Sintered	.14
Nondestructive Search for Micrometer-Scale Platinum-Group Minerals	.16
Characterization of a Hard X-Ray Telescope	18

ENVIRONMENTAL SCIENCE	120
Speciation of Antimony in PET Bottles Produced in Japan and China by X-Ray Absorption Fine Structure Spectroscopy Y. Takahashi	
Synchrotron X-Ray Spectroscopic Evidence of Dioxin Formation Mechanism in Solid Waste Incinerator – Direct Chlorination of Carbon by Copper Chloride – M. Takaoka and T. Fujímorí	
Antimony Interaction with an Abiotic Reducer in Aquatic Environment: Green Rust Compounds S. Mitsunobu and Y. Takahashi	
INDUSTRIAL APPLICATIONS	128
X-Ray Reflectivity Study on Depth Profile of Acid Generator Distribution in Chemically Amplified Resists <i>T. Kozawa</i>	
Stability-Instability Transition of Reaction Fronts in Thermal Silicon Oxidation	
Direct Observation of Reduced Path Formation in CuO-Based Resistance-Switching Devices R. Yasuhara, H. Kumígashíra and M. Oshíma	
Characterization of Liquid Crystal Alignment on Rubbed Polyimide Film by Grazing-Incidence X-Ray Diffraction T. Koganezawa, I. Hirosawa and H. Ishii	
Precise Observation of Dynamic Structural Change of Pd Particles under CO/NO Catalytic Reaction Studied by Dispersive X-Ray Absorption Fine Structure D. Matsumura	
Crystal Structure at the Initial Growth Stage of Organic Semiconducting Thin Films Studied by GIXD N. Yoshimoto	
Formation of Autoclaved Aerated Concrete Studied by <i>In Situ</i>	
Detection of Tooth Enamel Microstructural Transformations during De- and Re-mineralization in the Early Stage of Caries <i>T. Tanaka, Y. Terada and H. Kamasaka</i>	
NUCLEAR PHYSICS	146
Further Evidence for $\Theta^+$ from LEPS	
Near-Threshold Photoproduction of Λ(1520) from Protons and Deuterons	



Accelerators & Beamlines Frontiers 152	2
Beam Performance 15	3
Developments and Upgrades of Storage Ring and Booster Synchrotron	3
Developments and Upgrades of Linac	4
New Apparatus & Upgrades 16	5
A Beamline Dedicated to Soft Matter Research has been Now Launched at BL03XU	5
The University of Tokyo Soft X-Ray Materials Science Beamline 16	7
New Microbeam Beamline Dedicated to Protein Microcrystallography	9
TOYOTA Beamline BL33XU	0
Development of the High-Throughput and High-Accuracy Measurement System for Powder Diffraction 17	1
Development of a Differential Pumping System of Soft X-Ray Beamline for Windowless Experiments under Normal Atmospheric Conditions	2

Facility Status 1	174
Introduction 1	175
Machine Operation 1	176
Beamlines 1	177
User Program and Statistics 1	180
Budget and Personnel 1	184
Research Complex 1	185
Users Societies, Conferences and Other Activities 1	187

Project XFEL	189
Progress of the XFEL Project	

NewSUBARU	194
EUV Interference Lithography at BL9 Beamline in NewSUBARU	

Note: The principal publication(s) concerning each article is indicated with all author's names in italics in the list of references.