

## **CONTENTS** 2007

Preface	9
	10
Scientific Frontiers	10
A PLACE IN THE "X-RAY" SUN – Endeavors at Frontiers of Research M. Takata	11
LIFE SCIENCE: STRUCTURAL BIOLOGY	16
Crystal Structure of Human Membrane Integrated Protein Responsible for Biosynthesis of Cysteinyl Leukotrienes H. Ago and M. Miyano	18
Structures of Human MD-2 Coreceptor and Its Complex with Antiendotoxic Lipid IVa Preventing Endotoxin Shock Y. Satow and U. Ohto-	20
Structural Study on the Extracellular Signaling Molecule Reelin Involved in the Cortical Layer Formation <i>T. Nogi, N. Yasui and J. Takagi</i>	22
Real-time Small-angle X-ray Scattering Observation of Assembly and Disassembly Dynamics of Cyanobacterial Periodosome S. Akíyama, A. Nohara, K. Ito and Y. Maéda	24
Structural Insights into RNA-dependent Cysteine Biosynthesis in Archaea R. Fukunaga and S.Yokoyama	26
Structural Basis of Dynamic Polymerization of DIX Domains: Revised Model of Wnt Signaling N. Shibata and Y. Higuchi	28
Crystal Structures of [NiFe] Hydrogenase Maturation Proteins, HypC, HypD, and HypE S. Watanabe and K. Miki	30
Extensive Structural Similarity between the Flagellar Type III ATPase FliI and F1-ATPase Subunits K. Imada, T. Minamino and K. Namba	32
Structural Basis for Substrate Recognition and Dissociation by Human Transportin 1 T. Imasaki, T. Shimizu, H. Hashimoto, M. Yamada and M. Sato	34
Crystal Structure of MgtE Mg <sup>2+</sup> Transporte M. Hattori and O. Nureki	36
Crystal Structure of the EFC/F-BAR Domain –Mechanism of Membrane Invagination in Endocytosis– A. Shímada and S. Yokoyama	38

LIFE SCIENCE: MEDICAL BIOLOGY	40
Twisting Conformational Changes of Single KcsA Potassium Channel upon Gating Using Diffracted X-ray Tracking H. Shimizu, M. Iwamoto; Y. C. Sasaki and S. Oiki	42
Effects of Sustained Length Dependent Activation on In Situ Cross-bridge Dynamics in Rat Hearts J. T. Pearson, M. Shíraí and N. Yagí	44
Structural Analysis of Human Hair in Aqueous Solutions Using Microbeam X-ray Diffraction T. Inoue, N. Ohta and N. Yagi	46
In Vivo X-ray Angiography of Mouse Brain Using Synchrotron Radiation	48
Imaging Lung Aeration at Birth Identifies Better Strategies for Ventilating Very Premature Babies S. B. Hooper, M. Kitchen, N. Yagi and R. Lewis	50
MATERIALS SCIENCE: STRUCTURE	52
Incommensurately Modulated Phase of Phosphorus under Pressure H. Fujihisa, Y. Akahama and Y. Ohishi	54
Direct Observation of Oxygen Stabilization in Layered Ferroelectric Bi <sub>3.25</sub> La <sub>0.75</sub> Ti <sub>3</sub> O <sub>12</sub> C. Moríyoshí, Y. Kuroíwa and Y. Noguchí	56
Unique Structures in Yttrium Trihydride at High Pressure A. Machída	58
High-oxygen-pressure Crystal Growth of Ferroelectric Bi <sub>4</sub> Ti <sub>3</sub> O <sub>12</sub> Single Crystals Y. Noguchí, M. Míyayama and Y. Kuroíwa	60
Structural Characterization of Ar <sup>+</sup> -irradiated SrTiO <sub>3</sub> Showing Room-temperature Blue Luminescence Y. Shímakawa, D. Kan and O. Sakata	62
Multilayer Relaxation of Ru Studied by Surface X-ray Diffraction M. Nakamura and O. Sakata	64
Instability of Electron Gas in an Expanding Metal K. Matsuda, K. Tamura and M. Inui	66
A Peculiar Fluctuation in the Metal-nonmetal Transition Observed in the Supercritical Fluid Mercury M. Inui, K. Matsuda and K. Tamura	68
Mesoscopic Structure Analysis of Metallic Materials by Coherent X-ray Diffraction Microscopy Y. Takahashí, Y. Níshíno, T. Ishíkawa and E. Matsubara	70
How Can We Determine Noncrystalline Structures from Diffraction Data?	72



Nanoscale Elastic Inhomogeneity in a Pd-based Metallic Glass Observed by Inelastic X-ray Scattering and Ultrasonic Experiments <i>T. Ichitsubo</i> ; <i>E. Matsubara</i> , <i>S. Hosokawa and A. Q. R. Baron</i>	76
Lattice Dynamics of the Zn-Mg-Sc Icosahedral Quasicrystal and Its 1/1 Periodic Approximant	78
Isotope Effect in Li <sub>x</sub> ZrNCl Superconductors Y. Taguchí and Y. Iwasa	80
Phonon Softening in Superconducting Diamond M. Hoesch and T. Fukuda	82
Charge Density Study of Transparent <i>p</i> -type Semiconductor (LaO)CuS	
Perpendicular Magnetization of 1-nm-Thick Epitaxial FePt Films Probed by Soft X-ray Magnetic Circular Dichroism S. Imada	86
Infrared Study of the Valence Transition Compound YbInCu <sub>4</sub> Using Cleaved Surfaces	
Itinerant to Localized Transition of <i>f</i> -Electrons in Heavy Fermion Superconductor UPd <sub>2</sub> Al <sub>3</sub> S. Fujimori	90
Probing Bulk Three-dimensional Fermi Surfaces of a Strongly Correlated Material by Soft X-ray Angle-resolved Photoemission A. Sekiyama, M. Yano and S. Suga	92
Nuclear Forward Scattering Study of Relaxation in the Geometrically Frustrated Ferromagnet Dy <sub>2</sub> Ti <sub>2</sub> O <sub>7</sub> J. P. Sutter, A. Q. R. Baron, R. Higashinaka and S. Tsutsui	94
Configurational Energetics in Ice Ih Probed by Compton Scattering K. Nygård, M. Hakala and K. Hämäläinen	
High Field X-ray Magnetoabsorption Spectroscopy of Valence Transition in YbInCu <sub>4</sub> Y. H. Matsuda and T. Inami	
CHEMICAL SCIENCE	100
Structural Investigation of the Charge-transfer Transition in Two-dimensional Cyanide Complex	102
Correlation between Molecular Arrangement and Emission Mechanism of Melem in Langmuir-Blodgett Films of Lanthanide(III) Complex with Stearic Acid A. Ishii and M. Hasegawa	104
Mesoscopic Tiling Patterns of ABC Star-shaped Terpolymers Studied by	106
Degree of Supercooling (ΔT) Dependence and Mass Distribution Function Q(N,t) of Nano-nucleation of Polymers by SAXS K. Okada, S. Sasaki and M. Hikosaka	108

Structure-magnetic Properties of Rare-earth Metals Confined in Carbon Nano-spaces	110
Femtosecond Nuclear Dynamics at Core-valence Doubly Excited States Y. Hikosaka, E. Shigemasa and N. Kosugi	112
Young's Double-slit Experiment Using Core-level Photoemission from $N_2$	114
Discontinuous Reorientation of Crystal Lattice and Its Relation with Higher-Order Structure Change in Drawing Process of Polyethylene Fibers K. Tashiro, S. Takeda and M. Hanesaka	116
Liquid Structure of Room Temperature Ionic Liquids Revealed by High-energy X-ray Diffraction and Molecular Dynamics Simulation Y. Umebayashi, S. Fukuda, Y. Kameda and S. Kohara	118
Exciton Properties of Organic Molecules Revealed by Inelastic X-ray Scattering	120
EARTH & PLANETARY SCIENCE	122
Microstructure of Bubbles in Flowing Magma M. Nakamura, S. Okumura and A. Tsuchiyama	124
In Situ Observation of Liquid Immiscibility in the Fe-O-S System	126
High-pressure B2 Phase of FeS: New High-pressure Polymorph under the Earth's Core Conditions N. Sata, K. Hirose and H. Kobayashi	128
Development of <i>In Situ</i> Brillouin Spectroscopy at High Pressure and Temperature Using Synchrotron Radiation and Infrared Laser Heating System: Application to the Earth's Deep Interior Application to the Earth's Deep Interior M. Murakami	130
ENVIRONMENTAL SCIENCE	132
XAFS Study on the Comparison of Soil-water Distribution of Antimony	134
EXAFS Investigation of Adsorption and Separation Phenomena of Metal Ions in Organic Resin – Specific Coordination Properties in Micropores A. Ikeda, H. Shiwaku and T. Yaita	136
<i>In Situ</i> Time-resolved Time-gating Quick XAFS Study for Dynamic Surface Events on the Pt/C Cathode in a Fuel Cell M. Tada and Y. Iwasawa	138
Sintering Inhibition Mechanism of Platinum Supported on Ceria-based Oxide for Automotive Catalyst Y. Nagaí, K. Dohmae and N. Takagí	140
Why Gold Becomes Active When in Form of Dispersed 3 nm Particles? Reaction Intermediate Detected at SPring-8 Y. Izumi	142
Atomic-scale Environment of Re and Radiogenic <sup>187</sup> Os in Natural Molybdenite Mineral Related to Reliable Re-Os Dating <i>Y. Takahashi</i>	144





INDUSTRIAL APPLICATIONS	•••• 146
Effect of Interface Layers on Phase-change Recording Material as Analyzed by HX-PES Method <i>T. Nakai and M. Yoshiki</i>	148
Application of XMCD-PEEM to the Magnetic-domain Structural Analysis of Nd-Fe-B Sintered Magnets S. Yamamoto, M. Yonemura and T. Kinoshita	150
Study of Correlation between LC Display Quality and Degree of Crystallinity at Surface of Alignment Film T. Sakai, H. Ishii and I. Hirosawa	152
Three-dimensional Topography Using an X-ray Microbeam and Novel Slit Technique R. Tanuma and T. Tamorí	154
Application of X-ray Microtomography to Evaluate Thermal Fatigue Crack Propagation and Lifetime in Flip Chip Interconnects H. Tsuritani, T. Takayanagi and T. Sayama	156
Detection of Cracks due to SCC in Ni-base Alloys by Synchrotron Radiation CT Imaging S. Nakahigashi, M. Terasawa, A. Yamamoto and K. Kajiwara	158
Infrared SR Analysis of Trace Vitamin E in an Artificial Joint Made of Ultrahigh Molecular Weight Polyethylene (UHMWPE) N. Níshímura, E. Fukuda, Y. Yamazakí, Y. Ikemoto and T. Moríwakí	160
Analysis of Ingredients that Penetrate into the Inside of Hair by Infrared Microspectroscopy S. Inamasu, T. Moríwakí and Y. Ikemoto	162
INSTRUMENTATIONS & METHODOLOGY	164
Application of WAXD/SAXS Simultaneous Measurements to Study Aggregation Structure of Polyvinylfluoride in Ferroelectric Phase Transition Process H. Masunaga, S. Sasaki and Kohji Tashiro-	166
Ultrahigh-pressure Synchrotron Radiation <sup>57</sup> Fe-Mössbauer Spectroscopy Using Single-line Pure Nuclear Bragg Reflection <i>T. Mitzui</i>	168
Milliseconds Quick XAFS System Using Quasimonochromatic Undulator Radiation T. Uruga, H. Tanída and H. Yamazakí	170
Development of a Scanning Tunneling Microscope for <i>In Situ</i> Experiments with a Synchrotron Radiation X-ray Microbeam A. Saito; Y. Kuwahara and M. Aono	172
Unique Recovery of Complex Transmissivity Using X-ray In-line Holography and Two-beam Interferometry Y. Kohmura and T. Sakurai	174
$X \rightarrow X$ +EUV Parametric Conversion Interfered with by Compton Scattering	176

NUCLEAR PHYSICS
Coherent φ-Meson Photoproduction from Deuterium
Backward-angle Photoproduction of $\pi^0$ Mesons on Proton at BL33LEPS
Accelerators and Beamlines Frontiers 184
Beam Performance 185
Developments and Upgrades of Storage Ring
Developments and Upgrades of Linac 197
Controls & Computing 199
Virtualization of the Operator Consoles on Beamline Control System
Network Security in SPring-8
New Apparatus & Upgrades 203
Undulator Update in 2007
Development of SAXS Apparatus Equipped at Hyogo Prefectural Beamline BL08B2
Upgrade of High Pressure Research Beamline BL10XU
Construction of a Side Beamline of BL12XU for HAXPES
High-resolution and Highly Stabilized Beamline BL17SU

## **Facility Status**

213

	General	214
	Machine Operation	216
	Beamlines	217
	Proposal Schemes, Utilization Statistics and Research Outcome	221
	Budget and Personnel	225
	Research Complex	226
	Users Societies, Conferences and Other Activities	228
Project >	(FEL	230
	Progress of the XFEL Project at SPring-8	231
NewSUB	ARU	236
	Surveying Nanosize Particle and Flaw – Mask Defect Inspection System in Extreme Ultraviolet Lithography for Next-Generation Lithography –	237

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

