

# CONTENTS

## 2004

<b>Preface .....</b>	7
<b>Scientific Frontiers .....</b>	8
<b>Life Science: Structural Biology .....</b>	9
Crystal Structure of the Calcium Pump with a Bound ATP Analogue .....	10
<i>C. Toyoshima and T. Mizutani</i>	
Crystal Structure and Function of MexAB-OprM Antibiotic Efflux Pump Subunits .....	12
<i>of Pseudomonas aeruginosa</i>	
<i>T. Nakae</i>	
Low-spin Heme of Cytochrome c Oxidase as Driving Element of Proton .....	14
<i>T. Tsukihara</i>	
Crystal Structure of C-Terminal Clock-oscillator Domain of KaiA from <i>Thermosynechococcus elongatus</i> BP-1 .....	16
<i>T. Nakatsu</i>	
Crystal Structure of Human DNA Recombinase, Dmc1 .....	18
<i>T. Kinebuchi, H. Kurumizaka and S. Yokoyama</i>	
Crystal Structure of Elongation Factor P from <i>Thermus thermophilus</i> HB8 .....	20
<i>K. Hanawa-Suetsugu, S. Sekine, M. Shirouzu and S. Yokoyama</i>	
Anaerobic and Aerobic Structures of Ferredoxin II from <i>Desulfovibrio Gigas</i> .....	22
<i>Y.-C. Hsieh, M.-Y. Liu and C.-J. Chen</i>	
Collapse and Search Dynamics of Apomyoglobin Folding Revealed by Submillisecond .....	24
Observations of $\alpha$ -Helical Content and Compactness	
<i>S. Takahashi, T. Uzawa and T. Fujisawa</i>	
Wide-angle X-ray Scattering can Reveal Hierarchical Map of Unfolding-refolding .....	26
Transition of Protein	
<i>M. Hirai and M. Koizumi</i>	
$\beta$ -Helix is a Likely Core Structure of Yeast Prion Sup35 Amyloid Fibers .....	28
<i>A. Kishimoto, K. Hasegawa and K. Namba</i>	
<b>Life Science: Medical Biology .....</b>	30
Structural Transients of Contractile Proteins upon Sudden ATP Liberation in .....	31
Skeletal Muscle Fibers	
<i>J. Wakayama</i>	
Real Time <i>In Vivo</i> Measurements of Crossbridge Dynamics in Cardiac Muscle .....	33
<i>J. T. Pearson, M. Shirai and N. Yagi</i>	
Observation of Kinetic Response of Mineral and Collagen Phases in Bone by .....	35
X-ray Diffraction	
<i>M. Todoh</i>	
Analysis of Microvasculature of Transplanted Rat Tumors using Synchrotron Radiation .....	37
Microangiography System	
<i>R. Tokiya, K. Umetani and Y. Imajo</i>	
2D and 3D Visualization of Peripheral Lung Structure by Synchrotron Radiation CT .....	39
<i>H. Ikura and K. Shimizu</i>	

<b>Materials Science: Structure .....</b>	<b>41</b>
Direct Observation of Intermolecular Interaction for Organic Magnet by .....	42
Low-temperature X-ray Diffraction <i>Y. Wang and J.-J. Lee</i>	
Disordered Zinc in Thermoelectric Material $Zn_4Sb_8$ with Phonon-glass and .....	44
Electron-crystal Properties <i>E. Nishibori, G.J. Snyder, P. Rabiller, M. Christensen and B. B. Iversen</i>	
Doping Effect of Cu-O Bond Stretching Phonon in $La_{2-x}Sr_xCuO_4$ Studied by .....	46
Inelastic X-ray Scattering <i>J. Mizuki, T. Fukuda and K. Yamada</i>	
Crystal Structure of Superconducting Sodium Cobalt Oxide .....	48
<i>K. Takada and I. Nakai</i>	
High-quality As-grown $MgB_2$ Film Fabrication at Low Temperature using In-plane-lattice .....	50
Near-matched Epitaxial-buffer Layer <i>O. Sakata, S. Kimura and S. Kubo</i>	
X-ray Diffraction Study of Charge-density-wave Phase Transition on In/Cu(001) .....	52
<i>T. Aruga and S. Hatta</i>	
Strain Field under the $SiO_2/Si(001)$ Interface Revealed by Phase-sensitive X-ray .....	54
Diffraction Technique <i>W. Yashiro</i>	
Structural Determination of Topological Crystal .....	56
<i>S. Tanda, Y. Nogami and N. Ikeda</i>	
Glass Forming at Limit: How glass forms when there is insufficient network former ? .....	58
<i>S. Kohara, K. Suzuya and K. Takeuchi</i>	
Direct Observation of Macroscopic Separation of Dense Fluid Phase and Liquid Phase .....	60
of Phosphorus <i>Y. Katayama</i>	
Observation of Fast Sound in Expanded Fluid Mercury Accompanying Metal-nonmetal Transition ..	62
<i>M. Inui, D. Ishikawa and K. Tamura</i>	
Collective Dynamics of Supercritical Water .....	64
<i>T. Yamaguchi, K. Yoshida and S. Hosokawa</i>	
 <b>Materials Science: Electronic &amp; Magnetic Properties .....</b>	<b>66</b>
Magnetic Compton Profiles of Co/Pd Multilayers .....	67
<i>H. Sakurai</i>	
Direct Evidence of Ferromagnetic Spin Polarization in Gold Nanoparticles .....	69
<i>Y. Yamamoto and H. Hori</i>	
Real-space Imaging of Phase Separation Near Mott Transition in Organic Superconductor .....	71
$\kappa$ -(BEDT-TTF) <sub>2</sub> Cu[N(CN)] <sub>2</sub> Br <i>T. Sasaki</i>	
Soft X-ray Angle-resolved Photoemission Spectroscopy of Strongly Correlated Bulk .....	73
Electronic Structures of $SrCuO_2$ and $Sr_2RuO_4$ <i>S. Suga and A. Sekiyama</i>	
Hybridization of Cr 3d-N 2p-Ga 4s in the Wide-band-gap Diluted Magnetic .....	75
Semiconductor $Ga_{1-x}Cr_xN$ <i>J.-J. Kim, H. Makino and T. Yao</i>	

Electronic Excitations in $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ Studied by Resonant Inelastic X-ray Scattering .....	77
<i>K. Ishii and T. Inami</i>	
Extended Spin-polarized X-ray Absorption Near-edge Spectra of $\text{MnO}$ .....	79
<i>H. Hayashi</i>	
Actively-controlled Oxidation of Cu(100) with Hyperthermal $\text{O}_2$ Molecular Beam .....	81
<i>M. Okada, T. Kasai and Y. Teraoka</i>	
Depining Process and Dynamic Phase Transition of Charge-density Wave in $\text{K}_{0.3}\text{MoO}_4$ .....	83
<i>C.-H. Du, M.-T. Tang and S.-L. Chang</i>	
<b>Chemical Science.....</b>	<b>85</b>
Ultrafast Fragmentation Processes of $\text{CF}_4$ Studied by Electron-ion Momentum .....	86
Coincidence Spectroscopy	
<i>G. Pruemper, K. Ueda and Y. Tamenori</i>	
Real-time Observation of Filler Aggregate Structure using Two-dimensional Ultra-small-angle ..... X-ray Scattering	88
<i>Y. Shinohara, H. Kishimoto and Y. Amemiya</i>	
Guest Shape-responsive Fitting of Porous Coordination Polymer with Shrinkable Framework .....	90
<i>R. Matsuda</i>	
Direct Observation of Hydrogen Molecules Adsorbed in Microporous Coordination Polymer .....	92
<i>Y. Kubota, M. Takata and S. Kitagawa</i>	
Direct Observation of Charge Ordering Pattern in an Organic Conductor $(\text{EDO-TTF})_2\text{PF}_6$ .....	94
<i>S. Aoyagi, H. Yamochi and G. Saito</i>	
Study on $[\text{FeN}_6]$ Core of $[\text{Fe}(2\text{-pic})_3]\text{Cl}_2 \cdot \text{EtOH}$ in Photo-induced High-spin State by .....	96
Nuclear Resonant Inelastic Scattering	
<i>G. Juhász, M. Seto and Y. Maeda</i>	
Dependence of Molecular Shape Resonance Energy on Inter-nuclear Distance Probed by .....	98
High-resolution Core-level Photoelectron Spectroscopy	
<i>C. Makochekanwa, H. Tanaka and K. Ueda</i>	
Ordering of Hydrogen Bonds in High-pressure Low-temperature Ices .....	100
<i>Y.Q. Cai, H.-K. Mao, J.S. Tse and C.C. Kao</i>	
<b>Earth &amp; Planetary Science .....</b>	<b>102</b>
Post-perovskite Phase Transition in $\text{MgSiO}_3$ .....	103
<i>K. Hirose</i>	
Ultrahigh Pressure Generation in the Kawai-type Apparatus: Application to .....	105
the Wurzite-rocksalt Transition in GaN	
<i>E. Ito</i>	
New High-pressure Form of $\text{KAlSi}_3\text{O}_8$ Hollandite under Lower Mantle Conditions .....	107
<i>Y. Sueda and T. Irifune</i>	
XAFS Study of Liquid Germanate under Pressure .....	109
<i>O. Ohtaka, H. Arima and A. Yoshiasa</i>	
Three-dimensional Structures of Cosmic Dust by Microtomography .....	111
<i>A. Tsuchiyama, T. Nakano and K. Uesugi</i>	

<b>Environmental Science.....</b>	<b>113</b>
XAFS Analysis of Fine Structure of Palladium Species Immobilized on Hydroxyapatite Surface ... <i>K. Kaneda</i>	114
Change in Chemical Form of Copper in Fly Ash at Temperatures Suitable for Dioxin Formation ... <i>M. Takaoka</i>	116
Individual Micrometer-size Aerosol Particle Analysis with On-site Combination of Electron Microscope and Synchrotron X-ray Microscope <i>Y. Tanaka, T. Tanabe and J. Kawai</i>	118
<b>Industrial Applications .....</b>	<b>120</b>
XAFS Study of Local Structural Changes in Ge-Sb-Te during Optical Recording below ... the Diffraction Limit <i>A.V. Kolobov, P. Fons and J. Tominaga</i>	121
Structural and Electronic Properties of Platinum Nanoparticle Surface in an Aqueous System ... Probed by <i>In Situ</i> X-ray Absorption Spectroscopy <i>H. Imai and K. Izumi</i>	123
Effect of Interfacial Layers on Stress Depth Profile of Ceramic Layers for Cutting Tools ..... <i>S. Tsuchiya</i>	125
White X-ray Topography Combined with a Topo-tomographic Technique for Determining ... Three-Dimensional Dislocation Structures in Silicon <i>S. Kawado, S. Iida and Y. Chikaura</i>	127
Observations of RAF-SiC Single Crystals by Synchrotron X-ray Topography ..... <i>S. Yamaguchi, D. Nakamura and Y. Hirose</i>	129
Mechanism of Curing Reaction for Polymer-modified Cement Waterproofing Membrane ..... <i>M. Kotera, I. Matsuda and K. Miyashita</i>	131
<i>In Situ</i> High-resolution X-ray Tomography of Fracture Micromechanisms in ... Aluminium Foam <i>H. Toda, T. Ohgaki and K. Uesugi</i>	133
<b>Instrumentation &amp; Methodology .....</b>	<b>135</b>
Characterization of Synthetic IIa Diamonds for Third and Fourth Generation X-ray Sources ..... <i>K. Tamasaku</i>	136
Characterization of Beryllium Windows using Coherent X-rays ..... <i>S. Goto</i>	138
High Spatial Resolution Phase Measurement by Micro-interferometry using a Hard X-ray ... Imaging Microscope <i>T. Koyama and Y. Kagoshima</i>	140
Verification of a New X-ray <i>n</i> -Beam Dynamical Theory using an Arbitrary-polarization- ... generating X-ray Phase-retarder System <i>K. Ohkitsu</i>	142
Development of Quarter-wave Plates and Full Polarization Measurement near 400 eV ..... <i>T. Hirano and H. Kimura</i>	144

<b>Nuclear Physics .....</b>	<b>146</b>
$\phi$ - Meson Photoproduction Near the Threshold .....	147
<i>T. Mibe, W.C. Chang and T. Nakano</i>	
Is the Property of Mesons Modified in the Nuclear Medium? – $\phi$ Meson Photoproduction .....	149
from Nuclei – <i>T. Ishikawa and M. Fujiwara</i>	
 <b>Accelerators &amp; Beamlines Frontiers .....</b>	<b>151</b>
Beam Performance and Upgrades of the Storage Ring .....	152
Developments and Upgrades of Linac .....	157
Insertion Devices .....	159
-Development of Cryoundulators	
Detectors .....	162
- One-dimensional Microstrip Detector	
- Pixel Detector and Microstrip Detector	
- Flat Panel Detector	
New Apparatus & Upgrades .....	166
- High-resolution Micro-CT System using 10-Megapixel-CCD X-ray Detector	
- Extending the Limits of Inelastic X-ray Scattering: 12 Analyzers and 1 meV Resolution	
- New Surface Microscopy – Spectroscopic Photo-emission Electron Microscopy and Low Energy Electron Microscopy (SPELEEM) with Synchrotron Radiation	
- Development of Monochromator Stabilization System	
 <b>Facility Status .....</b>	<b>172</b>
Machine Operation .....	173
Beamlines .....	174
User Operation .....	177
Budget and Manpower .....	180
Organization .....	181
International Conferences and Workshops .....	184