

CONTENTS

2011

Preface	7
Scientific Frontiers	9
A PLACE IN THE “X-RAY” SUN – 2011 Breakthrough of the Year	10
LIFE SCIENCE: STRUCTURAL BIOLOGY	14
Structure of photosystem II oxygen-evolving complex at 1.9 Å resolution	16
<i>Y. Umena, K. Kawakami, J. R. Shen and N. Kamiya</i>	
Nitric oxide reductase; a key enzyme in understanding structural and functional conversion	18
of respiratory enzymes in their molecular evolution	
<i>Y. Shiro</i>	
Crystal structure of O ₂ -tolerant [NiFe] hydrogenase reveals the mechanism of O ₂ -tolerance	20
attributable to a redox-dependent conformational change of [4Fe-3S] cluster	
<i>Y. Shomura and Y. Higuchi</i>	
Crystal structure of SecDF, a Sec translocon-associated membrane protein	22
<i>T. Tsukazaki and O. Nureki</i>	
The flagellar type III protein export apparatus and F/V type ATPases share a common architecture	24
<i>K. Imada, T. Minamino and K. Namba</i>	
Crystal structure of the proton pumping rhodopsin ARII from marine alga <i>Acetabularia acetabulum</i>	26
<i>T. Wada and S. Yokoyama</i>	
X-ray structure of functional full-length dynein motor domain	28
<i>T. Kon, K. Sutoh and G. Kurisu</i>	
Structure of florigen activation complex	30
<i>I. Ohki, K. Shimamoto and C. Kojima</i>	
Crystal structure of the human CENP-A nucleosome: Implications for the molecular architecture	32
of centromeric chromatin	
<i>H. Tachibana, W. Kagawa and H. Kurumizaka</i>	
Structural basis of type II topoisomerase inhibition by the anticancer drug etoposide	34
<i>C. C. Wu, T. K. Li and N. L. Chan</i>	
LIFE SCIENCE: MEDICAL BIOLOGY	36
A new approach for structure analysis of two-dimensional membrane protein	38
crystals using X-ray powder diffraction data	
<i>R. A. Dilanian</i>	
Hard X-ray Fourier transform holography from an array of oriented referenced objects	40
<i>H. Iwamoto</i>	
Discontinuities in the gradient index structure of eye lenses	42
<i>M. Hoshino, N. Yagi and B. Pierscionek</i>	

Phase-contrast X-ray imaging of auditory ossicles in osteopetrotic mice	44
<i>K. Matsuo, N. Nango and A. Momose</i>	
Visualization of circadian ticking of cyanobacterial clock protein KaiC in real time	46
<i>A. Mukaiyama, T. Kondo and S. Akiyama</i>	
MATERIALS SCIENCE: STRUCTURE	48
Discovery of iron-based superconductor with platinum arsenide layers	50
<i>M. Nohara and H. Sawa</i>	
Colossal negative thermal expansion in BiNiO ₃ induced by intermetallic charge transfer	52
<i>M. Azuma, M. Mizumaki and T. Watanuki</i>	
Structural and valence transitions of EuH _x exposed to high pressure H ₂ conditions	54
<i>T. Matsuoka and K. Shimizu</i>	
Orbital state of excited electron identified by polarization-analyzed resonant inelastic X-ray scattering	56
<i>K. Ishii, S. Ishihara and Y. Murakami</i>	
Atomic and electronic structures of binary silicate glasses	58
<i>S. Kohara and J. Akola</i>	
Application of polyelectrolytes to novel adhesion system	60
<i>M. Kobayashi, M. Kikuchi and A. Takahara</i>	
MATERIALS SCIENCE: ELECTRONIC & MAGNETIC PROPERTIES	62
Ferroelectric transition and soft-phonon dynamics associated with off-center displacement of magnetic ions in perovskite Sr _{1-x} Ba _x MnO ₃	64
<i>H. Sakai, Y. Taguchi and Y. Tokura</i>	
Imaging doped holes in a cuprate superconductor	66
<i>Y. Sakurai and K. Yamada</i>	
Change of electronic structure from itinerant to localized state in heavy-fermion Ce compound : A Compton scattering study	68
<i>A. Koizumi</i>	
Discovery of paramagnetism with anomalously large magnetic susceptibility in high-pressure phase β(fcc)-cobalt	70
<i>N. Ishimatsu</i>	
High-magnetic-field soft X-ray spectroscopy using a 30 T pulse magnet	72
<i>T. Nakamura and Y. Narumi</i>	
Linear and circular magnetic dichroism in angle-resolved hard X-ray photoemission from Heusler compounds	74
<i>G. H. Fecher</i>	
Clarifying bonding nature in aluminum hydride using soft X-ray synchrotron radiation	76
<i>Y. Takeda</i>	

CHEMICAL SCIENCE	78
Observation of free-electron-laser-induced collective spontaneous emission (superfluorescence)	80
<i>M. Nagazono, J. R. Harries, H. Iwayama and E. Shigemasa</i>	
Interatomic electronic decay following multiple ionization of rare gas dimers	82
<i>K. Ueda, K. Sakai and H. Fukuzawa</i>	
Multifunctional porous crystals by hybridizing coordination polymers	84
<i>K. Hirai, O. Sakata, S. Kitagawa and S. Furukawa</i>	
Structural memory effect in solid-state transformation of kinetic coordination networks	86
<i>J. Martí-Rujas and M. Kawano</i>	
Single crystal structure determination using synchrotron X-ray of molecular spheres	88
synthesized by temporary labilization of the metal-ligand association <i>S. Sato and M. Fujita</i>	
Heterogeneous nanoscale structure in alkyl-methylimidazolium bromide ionic liquids:	90
a step towards greener solvents? <i>B. Aoun, M. A. González and M.-L. Saboungi</i>	
Ethanol-water structures at the microscopical level studied by X-ray Compton	92
scattering: extreme sensitivity to geometries <i>M. Hakala, I. Juurinen and K. Nakahara</i>	
Green ammonia synthesis from nitrate with photocatalytically generated hydrogen	94
on CuPd nanoalloys supported by TiO ₂ <i>M. Yamauchi, R. Abe and K. Kato</i>	
μ-XAFS analysis of a single catalyst particle of NiO _x /Ce ₂ Zr ₂ O _y on a SiO ₂ membrane	96
using X-ray μ-beam <i>M. Tada, N. Ishiguro and T. Uruga</i>	
EARTH & PLANETARY SCIENCE	98
Three-dimensional structures of Hayabusa samples using X-ray microtomography	100
<i>A. Tsuchiyama</i>	
Melting relation of FeS-H system under high pressure: Implications for the core of Ganymede	102
<i>Y. Shibazaki, E. Ohtani and H. Terasaki</i>	
Effect of iron content on electrical conductivity of ferropicrinite with implications	104
for the spin transition pressure <i>T. Yoshino</i>	
Phase transition in FeO and its implications for two-layered convection in Earth's outer core	106
<i>H. Ozawa</i>	
Spin crossover and iron-rich silicate melt in the Earth's deep mantle	108
<i>K. Hirose</i>	

ENVIRONMENTAL SCIENCE	110
Metal complexation inhibits the effect of oxalic acid in aerosols as cloud condensation nuclei (CCN) <i>Y. Takahashi</i>	112
Speciation of iodine in soil-water system based on XANES and HPLC-ICP-MS <i>Y. S. Togo, Y. Takahashi and Y. Terada</i>	114
Chlorinated aromatics in municipal-solid-waste fly ash inhibited by thermochemical zinc behavior <i>T. Fujimori and M. Takaoka</i>	116
Presence of HgSe (tiemannite) in various tissues of the striped dolphin: evidence obtained by μ -XRF-XRD and XAFS analyses <i>I. Nakai, Y. Terada and A. Hokura</i>	118
Identification of wood of archaeological heritages by X-ray micro-CT imaging <i>S. Tazuru-Mizuno and J. Sugiyama</i>	120
INDUSTRIAL APPLICATIONS	122
Investigation of the extraction method for hexavalent chromium in plastic samples <i>M. Oki</i>	124
<i>In situ</i> analysis of electrochemical reaction inside a fuel cell: Growth limit in behavior of platinum oxides formed on Pt-skin layers on Pt-Co bimetallic electrocatalysts <i>H. Imai</i>	126
Study of mixed ionic–electronic conduction mechanism in perovskite oxides using Rietveld refinements and the maximum-entropy method analysis of <i>in situ</i> synchrotron X-ray diffraction data <i>T. Itoh, K. Osaka and I. Hirose</i>	128
Structure analysis of acrylic emulsion particles and films by small-angle X-ray scattering <i>T. Yamamoto, T. Inoue and K. Kida</i>	130
Imaging of polymer foam by three-dimensional computed tomography <i>J. Tateishi and T. Nishiwaki</i>	132
NUCLEAR PHYSICS	134
Evidence for the $\kappa(800)$ meson exchange in $\gamma p \rightarrow K^{*0} \Sigma^+$ reaction at $E_\gamma = 1.85 - 3.0$ GeV <i>J. K. Ahn</i>	136
LEPS2: the new high-intensity GeV photon beamline BL31LEP <i>M. Yosoï</i>	138

Accelerators & Beamlines Frontiers	140
Beam Performance	141
Developments and Upgrades of Storage Ring and Booster Synchrotron	141
Developments and Upgrades of Linac	146
New Apparatus, Upgrades & Methodology	147
The RISING (Research & Development Initiative for Scientific Innovation of New Generation Batteries) beamline	147
A high-flux undulator beamline for high-resolution inelastic X-ray scattering	149
The SR nanobeam analysis center for green/nanotechnologies at BL37XU and BL39XU	151
Cheating the diffraction limit using X-ray nonlinear diffraction	153
Direct observation of X-ray induced atomic motion using SR-based STM	155
Two-dimensional approach to fluorescence yield XANES measurement using silicon drift detector	157
Facility Status	159
Introduction	160
Machine Operation	162
Beamlines	163
User Program and Statistics	166
Research Outcome	168
Budget and Personnel	168
Research Complex	169
Users Societies, Conferences and Other Activities	171
SACLA	173
Construction and Operation Status of SACLA	174
NewSUBARU	178
Major Activity of NewSUBARU	179

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