

Table of

Contents

PREFACE	1
----------------------	----------

HIGHLIGHTS

1. Materials Science	2
1-1 Observation of Nanometric Square Skyrmion Lattice in Centrosymmetric Tetragonal Magnet GdRu ₂ Si ₂	
1-2 Triangular-to-Square Lattice Transformation of Metastable Skyrmions	
1-3 Control of Polar Structure by Intermetallic Charge Transfer in Perovskite-Type Oxides	
1-4 Quadrupole Orders in the Spin–Orbit-Coupled 5d Mott Insulator Ba ₂ MgReO ₆	
1-5 Anisotropic Electronic Structure and Perpendicular Magnetic Anisotropy in the Layered Ferromagnetic Semiconductor (Ba,K) (Zn,Mn) ₂ As ₂ Elucidated by Angle-Dependent XMCD	
1-6 Growth of High-Quality Graphene on Single-Crystalline SiC Thin Film on Affordable Wafers for Beyond 5G Devices	
1-7 Detecting Quadrupole: A Hidden Source of Magnetic Anisotropy for Manganese Alloys	
1-8 Thickness Dependence of Electronic and Crystal Structures in VO ₂ Ultrathin Films	
1-9 Crystal Structure Analysis and Electron Density Distribution of Proton Conductive Layered Perovskite Sr ₂ (Ti _{1-x} M _x)O _{4-δ} (M = Fe, Al)	
2. Chemical Science	20
2-1 Helicoidal Supramolecular Alternating Copolymers Formed by Barbiturate Naphthalene Molecules with Ether and Ester Linkages	
2-2 Efficient and Selective Interplay of Ni and ZrO ₂ for CO ₂ Photoconversion into CH ₄ Revealed by Extended X-Ray Absorption Fine Structure Debye–Waller Factor	
2-3 Polarization of a Bromine Molecule in a Vanadium-Oxide Container	
2-4 Hindrance to the Oxidation of Pd–Au Alloy Surfaces Depending on the Atomic Configuration: An AP-XPS Study	
2-5 A Marangoni-Driven Molecular Automaton	
2-6 Measuring the Local High Temperature on Metal Nanoparticles under Microwave Irradiation using <i>in situ</i> XAFS	
2-7 Insights into the Deposition of Nanometer-Thick Nickel Oxide Films by Amino Acid Chelated Complex for Electrochromic Smart Windows	
2-8 Scaling Relation between Electrochemical Seebeck Coefficient and Viscosity	
3. Earth Science	36
3-1 Visualization of Reversible Shock Dynamics of Baddeleyite	
3-2 Characterization of Two Types of Cesium-Bearing Microparticles (CsMPs) Emitted from the Fukushima Nuclear Power Plant Accident Using Multiple Synchrotron Radiation Analyses	

4. Life Science	40
4-1 Cryo-EM and Crystallographic Analyses Reveal the Inhibition Mechanism of TLR7	
4-2 X-Ray and Neutron Joint Refinement Displays Shared Proton and Keto Form of Quinone Cofactor in Copper Amine Oxidase	
4-3 Structures of Human PPAR α with All Clinically Approved Fibrates and Endogenous Fatty Acids Revealed by X-Ray Crystallography	
4-4 An Integrated Analysis Combined with Automated X-Ray Crystallography for an Insect Ecdysteroidogenic Enzyme, Noppera-Bo	
4-5 Structural Elucidation of a Highly-Reducing Type II Polyketide Synthase	
4-6 Catalytic Mechanism of Cysteine Glycosidase Revealed by X-Ray Crystallography	
4-7 Improvement of Automated Crystallization and Monitoring System in PF	
4-8 The Response of DNA Damage in Normal Human Cell Populations Locally Irradiated with X-Ray Microbeams of Different Beam Sizes: Basic Study to Clarify the Health Effects of Internal Exposure	
4-9 Three-Dimensional Reconstruction of the Human Embryonic Bronchial Tree Using Phase-Contrast X-Ray Computed Tomography (PXCT) Images	
5. Instrumentation and Techniques	58
5-1 Machine-Learning-Accelerated Data Analysis for X-Ray Diffraction	
5-2 Soft X-Ray Vortex Beam Detected by Inline Holography	
5-3 Dielectric Response of BaTiO ₃ Electronic States under AC Fields via Microsecond Time-Resolved X-Ray Absorption Spectroscopy	
6. Accelerator	64
6-1 Mitigation of the Single-Bunch Current Limit by Using Higher Harmonic Cavities for PF Hybrid Filling Mode	
6-2 Realization of True-Top-Up Operation of PF-AR with 5 GeV	

OPERATION AND PROPOSALS

1. Outline of the Accelerators	68
2. Operation Summary	70
3. Experimental Stations	75
4. Summary of User Proposals	79

APPENDICES

Site and Organization	82
------------------------------------	-----------

Publication List is available on the PF's website (<https://www2.kek.jp/imss/pf/science/publ/pfhl/2020/>).