PREFACE

It is my great pleasure to share our research highlights based on the Photon Factory (PF) users' program during fiscal 2021 (April 2021 – March 2022). Since the PF users' program started in 1983, about 20,000 research papers have been published. We are proud to have produced a considerable number of papers describing breakthroughs in broad areas of materials and life sciences. I hope that this latest issue of PF Highlights will lead to new discoveries in scientific studies.

The PF launched its new organization in 2019, to strengthen its facility and research capabilities. While many light source facilities have been built or planned around the world, the PF has been reborn by returning to its roots. The primary mission of the PF is to nurture new techniques and young people to lead synchrotron-radiation science through R&D. The second mission is to promote various researches related to materials and life as an advanced infrastructure facility.

To pursue these missions, we started to improve the performance of the PF ring by replacing old accelerator components with new ones in 2020. We are choosing useful components for the new light source facility, which we are working on under a long-term plan to be realized in the early 2030s. In addition to normal applications, unique experiments can be performed by simultaneous use of two synchrotron-radiation beams in the new facility. In this issue of PF Highlights, we introduce the conceptual design of the Hybrid Ring, which is a candidate for the new facility and makes two-beam applications possible.

Based on the report of its Science Advisory Committee (SAC), KEK selected "R&D for New Light Source Facility" as a "Category I" project to be implemented during fiscal 2022–2027 without specifying the rank among the new projects that require budget in KEK PIP 2022 (Project Implementation Plan 2022). This decision by KEK has accelerated the improvement of the PF ring and triggered the reconstruction of BL-11 and BL-12. We will construct new beamlines dedicated for R&D at BL-11A (Hard X-ray) and BL-11B (Soft X-ray), enabling trial runs of innovative ideas in beamline sciences, including two-beam applications by simultaneous use of the new BL-11A and BL-11B. Accordingly, the current activities at BL-11 (-11A, -11B, and -11D) will be continued with a new beamline covering a wide energy range from 50 eV to 5000 eV at BL-12A. Prior to this, BL-12C was relocated during the summer break in 2022.

The PF will successfully carry out its missions with these short-term and long-term future plans.

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