Editor's Note

This is the 2024 issue of SPring-8/SACLA Research Frontiers, presents the outstanding scientific outcomes from SPring-8 and SACLA in 2023 and 2024. Each year, the best scientific achievements are selected from among more than 1,000 papers published at SPring-8 or SACLA. Time-resolved serial femtosecond protein crystallography using SACLA shows high activity, and research on a variety of functional materials aimed at achieving the sustainable development goals (SDGs) is ongoing. Research on spintronic devices and battery electrode materials is also thriving.

Starting with this issue, SPring-8/SACLA Research Frontiers is available exclusively in digital format. Previous issues were distributed in both print and online formats.

This issue features 47 articles and two review articles. One of the reviews was written by Professor Hiroshi Sawa (Nagoya Industrial Science Research Institute), who discusses ultra-precision valence electron density (VED) analysis. The VED was successfully extracted using high-performance X-ray diffraction, primarily at BL02B1, and the core-differential Fourier synthesis (CDFS) method. Visualization of 3*d* orbitals for several representative examples is presented. A recent activity report from his group is also included in this issue. The other review is contributed by Dr. Takeshi Morikawa (Toyota Central R&D Labs., Inc.). It is well known that industrial users account for approximately 20% of all SPring-8 users, with Toyota being one of the most active. They use various analysis techniques available at SPring-8 and SACLA. Dr. Morikawa introduces one of the key results from ongoing research on artificial photosynthesis.

SPring-8/SACLA Research Frontiers is composed primarily of two sections. The first, "Scientific Frontiers," presents the scientific results. The second provides additional information on the hard and soft infrastructures that support scientific research. Although some important parameters, such as the operation time, are included in the second section, other comprehensive and up-to-date statistical data on the operation of SPring-8 and SACLA can be found on our website: http://www.spring8.or.jp/en/about_us/spring8data/.
The full text of SPring-8/SACLA Research Frontiers is available at:
http://www.spring8.or.jp/en/news_publications/publications/research_frontiers/.
For the list of publications by SPring-8 users and staff, please visit our publication database:
http://www.spring8.or.jp/en/science/publication_database/.

On behalf of all the editors, I would like to express our sincere gratitude to those who recommended excellent research results for inclusion in this issue, as well as the users and staff of SPring-8, who contributed their reports.

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Editorial Board