

PREFACE

We are pleased to announce the publication of SPring-8/SACLA Research Frontiers 2023. JASRI's mission is to support users and ensure transparent and fair selection of experimental proposals as a user promotion organization of SPring-8 and SACLA registered with the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). Another mission of JASRI is to manage SPring-8 and SACLA, which are owned by RIKEN. In other words, JASRI works closely with RIKEN to operate and maintain SPring-8 and SACLA, located on the same campus, whose synergy produces groundbreaking results.

SPring-8 welcomed over 15,000 users in 2023, who came to conduct more than 2,000 experiments. Currently, SPring-8 users publish upwards of 1,000 research papers annually. Meanwhile, SACLA users have published over 50 research papers.



In 2023, several SPring-8 and SACLA users were awarded prestigious prizes for their achievements in science and technology. For example, Professor Kazuto Yamauchi (Osaka University) was awarded the Medal with Purple Ribbon in the fall of 2023 for his contributions to the development and commercialization of high-precision X-ray mirrors for SPring-8 and SACLA. Professor Ryosuke Kodama (Osaka University) was also awarded the Medal with Purple Ribbon in the fall of 2023 for his research in plasma science. Dr. Saori Imada-Kawaguchi (JASRI) was awarded the Morita Prize by the Japanese Association of University Women for her contribution to the development of synchrotron radiation X-ray measurements of liquid samples at high temperatures and pressures and its application to the study of extraterrestrial nuclei and meteorites.

This volume contains two comprehensive reviews. The first review, written by Professor Kazuto Yamauchi (Osaka University) presents his group's research and development pertaining to focusing mirrors for synchrotron X-rays. The ultimate focusing of XFEL beams at SACLA BL3 down to 7 nm was achieved and successfully applied for the observation of Ly_{α} and Ly_{β} emission from Cr films. In another review, Dr. Alfred Q. R. Baron (RIKEN SPring-8 Center/JASRI), describes his group's recent endeavor regarding high-pressure science, liquids, thin films, and composite materials using meV-resolved inelastic X-ray scattering.

In the main part of this volume, active users of SPring-8 describe the essence of their results in fields including Life Science, Physical Science, Chemical Science, Earth & Planetary Science, and Industrial Applications. In addition, the principal activity reports on SPring-8/SACLA facilities are included in the part and Accelerators & Beamlines Frontiers and Facility Status.

I am very grateful to the many authors and experts who contributed their papers this volume. Special thanks are due to Dr. Toyohiko Kinoshita, Ms. Marcia Obuti-Daté and the members of the editorial board for their continuous efforts.

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