

PREFACE

On March 11, 2011, Japan was struck by the Great East Japan Earthquake with an unprecedented 9.0 magnitude, which caused tremendous damage in the eastern part of Honshu, the main island of Japan. In this regard, I personally would like to extend my heartfelt thanks for the messages of concern and encouragement that we received from all over the world.

Fortunately, SPring-8, which is located far from the seismic epicenter, experienced no damage to its facilities and the staff were all found safe and well. The 2011A research period started in April, 2011, as usual, and at present SPring-8 users are conducting their experiments quite normally.

However, some of Japan's major synchrotron radiation facilities experienced significant damage, and their users are losing valuable research opportunities. Hence, we have decided to extend our help to these affected facilities by offering priority beamtime at SPring-8 to their users for implementing research proposals. We hope that cutting-edge research can be continued by utilizing this emergency program.



As for updates on SPring-8 research activities, 2009B and 2010A were marked yet again with fruitful research periods. Many outstanding scientific achievements have been reported in almost all fields of natural sciences and excellent articles have been published in major scientific journals by SPring-8 users, as you will read in SPring-8 Research Frontiers 2010.

As another update, the construction of the XFEL was successfully completed in March 2011. We have given the XFEL facility the nickname SACLA (SPring-8 Angstrom Compact Free Electron Laser). After tuning the system, "lasing" was achieved on June 7, 2011, at the world's highest energy level, and we expect programs for SACLA users to start by the end of March 2012. This will make the SPring-8 campus the No. 1 COE of photon sciences in the world in its truest sense.

Last but not least, I want to acknowledge the devoted effort of the editor in chief, Professor Seishi KIKUTA, who has painstakingly edited all the volumes of SPring-8 Research Frontiers from the very beginning and is now retiring following this publication. *We deeply appreciate your dedication, KIKUTA sensei, thank you very much!*

白川 哲久

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EDITOR'S NOTE

SPring-8 Research Frontiers 2010 covers advances achieved during the last two consecutive research periods, the second half of 2009 (2009B) and the first half of 2010 (2010A). Remarkable scientific achievements at SPring-8 in various fields of basic and applied sciences including industrial applications are described, as well as the development of accelerators, beamlines and experimental apparatus, and the present status of the SPring-8 facility. The progress of the XFEL project at SPring-8 toward completion in FY2010 is also reported. In addition, activities using NewSUBARU, which forms an integral part of the research complex, are introduced.

The magnitude 9 earthquake that struck northeastern Japan recently has caused severe damage to many research institutes. Facing this situation, SPring-8 has decided to support the users of the affected facilities by offering beamtime. We expect that the users can maintain their activities owing to this support program.

The chief editor Professor Kikuta will retire after the publication of Research Frontiers 2010. He has edited thirteen volumes from the first Research Frontiers 1997/1998. Glancing over these volumes, it is clearly seen that recent research activities have reached a full mature phase and many cutting-edge studies appear one after another. Moreover, in the past three volumes, the profiles of some prominent group leaders have been introduced in the overview "A Place in the "X-ray" Sun."

In the contents, the title of "New Apparatus & Upgrades," which is contained in "Accelerators & Beamline," was changed to "New Apparatus, Upgrades & Methodology" in order to include papers concerning methodology, which cannot be classified in the other nine categories.

In the layout of Research Frontiers, photographs of flowers grown at the SPring-8 campus and the Harima Science Garden City have been inserted. Photographs taken by SPring-8 staff, Mr. T. Ozaki, Mr. M. Sugiura and Mr. M. Takata, are greatly appreciated.

Copies of SPring-8 Research Frontiers will be sent on request. The full text is also available on the SPring-8 website (<http://www.spring8.or.jp/>). For the list of publications produced by SPring-8 users and staff, please visit the publication database at http://www.spring8.or.jp/en/science/publication_database/.

We extend our appreciation to those who have recommended excellent research results suitable for publication in SPring-8 Research Frontiers. We would also like to express our sincere gratitude to the users and staff of SPring-8 for contributing their reports to this issue.

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