NewSUBARU

A 1.5 GeV synchrotron radiation ring named NewSUBARU is the main facility of the Laboratory of Advanced Science and Technology for Industry (LASTI) at University of Hyogo. NewSUBARU is at the site of SPring-8 and can provide light beams from IR to soft X-ray. Significant progress has been achieved in upgrading the accelerator and in operations. We have succeeded in storing 500 mA at 1 GeV and 200 mA at 1.5 GeV. The beam lifetime has increased to 14 hours for storing 100 mA at 1.5 GeV. The missions of NewSUBARU at the LASTI are to research on synchrotron radiation and its applications and to prepare a base of advanced engineering in the local area in collaboration with various industries.

At present, NewSUBARU has five bending section beamlines (BL-2, BL-3, BL-6, BL-10, BL-11), two short undulator beamlines (BL-7a, BL-7b), a long undulator beamline (BL-9) and an optical-klystron beamline (BL-1), as shown in Fig. 1. Using these beamlines, many research activities have been performed as follows, (1) BL-3: extreme ultra-violet lithography (EUVL) and the evaluation of a mask used in a future ULSI fabrication technology, (2) BL-2 and BL-11: micro-nano manufacturing technologies including the LIGA process for fabricating three-dimensional structures, (3) BL-6 and BL-7: surface modification of new materials by SR exposure and photoelectron spectroscopy, (4) BL-9: a high precision measurement technique and an EUV interferometer using coherent X-rays from the long undulator, and (5) developments instrumentation and techniques. Many of these activities are being carried out in collaboration with industries. For the advancement of evaluation and analysis by industry, a new analysis beamline will be constructed at BL-5.

NewSUBARU research activities for this year include the first demonstration of nuclear transmutation by a laser Compton backscattered gamma-ray beam and the development of high-performance EUV photo-resist material. The demonstration of nuclear transmutation was made using natural iodine. Radioactive isotopes of iodine have a long lifetime and, in addition they are soluble in water, thus it is relatively difficult to confine them for a long period. The γ-n cross-section of an iodine isotope is expected to be almost equal to that of stable natural iodine. The development of EUV photo-resist is successfully in progress. The photo-resist has been demonstrated to have a low exposure energy and low line-edge roughness. The new resist material may have a strong impact on EUVL technology.

Most of our research activities are being conducted in collaboration with industries, government research institutes and other universities. We will continue to respond to their requirements by offering new technologies.

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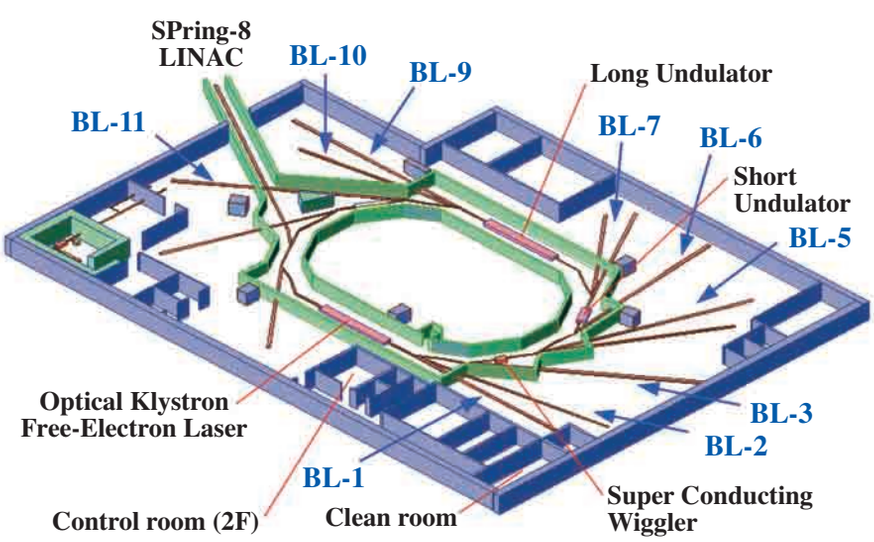

Fig. 1. Beamline arrangement in NewSUBARU.