Present Status of UVSOR-II

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After the major upgrade in 2003, we started to call our machine UVSOR-II. This 750 MeV storage ring now has an emittance of 27 nm-rad, which is the world-smallest value among the low energy light source below 1 GeV. UVSOR-II has four 4-m and four 1.5-m long straight sections and six of them can be used for insertion devices. Two in-vacuum type undulators and one variably polarized undulator are in operation. Construction of another variably polarized undulator is in progress and will be installed in the storage ring, in autumn 2006. To improve the short Touschek lifetime due to the small emittance and the low beam energy, the RF cavity has been upgraded to be capable of producing 150 kV accelerating voltage, which is three times higher than before. To solve the lifetime problem completely, we are going to introduce Top-up operation mode. To prepare for this, the magnet power supply of the booster synchrotron will be replaced in summer 2006 to realize the full energy injection.

UVSOR-II is operated for about 40 weeks in a year. It is normally operated under multi-bunch mode with partial filling. The typical lifetime is 6 hours at 200 mA. The single bunch operation is also conducted about two weeks per year, which provides pulsed synchrotron radiation (SR) for time-resolved experiments. Initial beam currents stored under multi-bunch and single-bunch modes are 350 mA (90MHz) and 100 mA (5.6MHz), respectively.

Eight bending magnets and three undulators provide synchrotron light to totally 13 beam-lines, at present. The bending magnet with its radius of 2.2 m provides SR, whose critical energy is 425 eV. The undulators cover the energy range from UV to soft X-rays. The 13 beam-lines can be classified into two categories. Nine of them are so-called "Open beam-lines", which are open to scientists of universities and research institutes belonging to the government, public organizations, private enterprises and those of foreign countries. The rest of the 4 beam lines are so-called "In-house beam-lines", which are dedicated to the use of the research groups within Institute for Molecular Science. We have 1 soft X-rays (SX) station equipped with a double-crystal monochromator, 7 EUV and SX stations with a grazing incidence monochromator, 3 VUV stations with a normal incidence monochromator (1 VUV station BL7U with an undulator is under construction), 1 infrared station equipped with Fourier transform interferometers, 1 non-monochromatized stations for the irradiation of white-light.

A high performance monochromator for BL3U and a high-resolution photoelectron energy analyzer for the end station at BL5U have been successfully installed, both of which utilize undulator radiation. The IR beam-line, BL6B has been upgraded to be capable of providing powerful far-infrared radiation. This was realized by introducing a so-called magic mirror as the first mirrors. The world-highest intensity among storage rings has been achieved in the wavelength range from the sub-millimeter to near IR region.