Development of Vacuum Ultraviolet Circular Dichroic Technology

- A breakthrough technique using AC modulated polarizing undulator -

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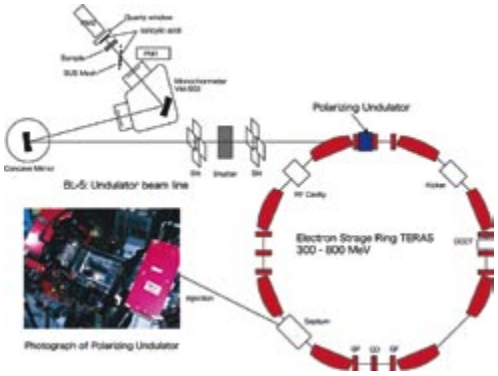
Circular dichroism (CD) is an optical measuring technique based on difference in polarization responses among different bio-polymer species. CD is caused by difference in response to left- and right-handed circular polarization depending on molecular structures, and exhibits spectra highly sensitive to 3D structure of bio-polymers. The AIST developed modulated polarizing undulator (SOR device) by using an electron storage ring, TERAS based on an original concept. With this SOR device, the AIST developed CD technique for identifying 3D structure of amino acids. Since the TERAS can produce AC-modulated polarized radiation of wavelength as short as 40 nm, it is expected to have CD measurement extended to 40 nm. The new technique has made it possible to measure CD in the VUV region, and is expected to contribute to determination of 3D structures of bio-polymers and acceleration of the development of chiral medical drug to eliminate drug-induced suffering.



AIST electron storage ring TERAS and polarizing undulator

Monochromatic X-ray Excitation X-ray Fluorescence Spectrometry as a new SI Traceable Method

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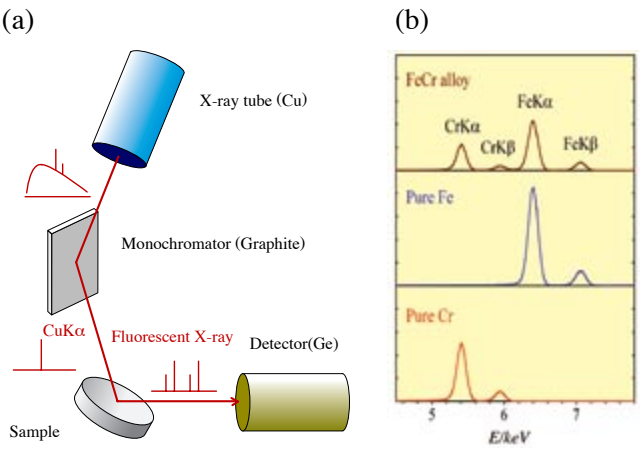
Monochromatic X-ray excitation X-ray fluorescence spectrometry was developed as a new SI traceable method (primary method of measurement). For the validation of the method, the certified reference materials such as FeCr alloys and sediments were analyzed. The evaluation of the uncertainties was carried out. The analytical results were in good agreement with the certified values within the uncertainties. Schematic drawing of the system and typical spectra are shown in Fig. (a) and (b) respectively. This method is non-destructive, and is used for various reliable measurements.



Schematic drawing of the system(a) and typical spectra(b)