

Beamlines at SPring-8

**BL01B1 XAFS BL02B1** Single Crystal Structure Analysis **BL02B2 Powder Diffraction BL04B1 High Temperature and High Pressure Research BL04B2 High Energy X-ray Diffraction BL05SS Accelerator Beam Diagnosis** BL08W **High Energy Inelastic Scattering BL08B2** Hyogo BM **Nuclear Resonant Scattering BL09XU BL10XU High Pressure Research BL11XU JAERI Materials Science II** BL12XU **NSRRC ID BL12B2 NSRRC BM** BL13XU **Surface and Interface Structures BL14B1 JAERI Materials Science I** BL15XU WEBRAM **BL16XU** Industrial Consortium ID (SUNBEAM-ID) BL16B2 Industrial Consortium BM (SUNBEAM-BM) BL17SU RIKEN Coherent Soft X-ray Spectroscopy **BL19LXU RIKEN SR Physics** 

for the Structural Biology Beamlines (BL41XU and BL38B1):

http://www.spring8.or.jp/e/user\_info/c\_f\_prop-04b-e/res-bl41\_38-04b-e.html

## BL19B2 Engineering Science Research

**BL20XU** Medical and Imaging II BL20B2 Medical and Imaging I **BL22XU JAERI Actinide Science II BL23SU JAERI Actinide Science I** BL24XU Hyogo ID BL25SU Soft X-ray Spectroscopy of Solid **BL26B1 RIKEN Structural Genomics I BL26B2 RIKEN Structural Genomics II BL27SU** Soft X-ray Photochemistry **BL28B2** White Beam X-ray Diffraction BL29XU **RIKEN Coherent X-ray Optics BL32B2 Pharmaceutical Industry BL33LEP Laser-Electron Photon BL35XU High Resolution Inelastic Scattering BL37XU Trace Element Analysis BL38B1** R&D (3) **BL38B2 Accelerator Beam Diagnosis** BL39XU **Magnetic Materials BL40XU High Flux BL40B2** Structural Biology II **BL41XU** Structural Biology I BL43IR **Infrared Materials Science BL44XU Macromolecular Assemblies BL44B2 RIKEN Structural Biology II BL45XU RIKEN Structural Biology I BL46XU** R&D (2) **BL47XU** R&D (1)

RADSYNCH'04:

The 3rd International Workshop on Radiation Safety of Synchrotron Radiation Sources, Radsynch'04, will be held at SPring-8 from November 17 to 19, 2004.

http://radsynch04.spring8.or.jp/

#### XRM2005:

The 8th International Conference on X-ray Microscopy, XRM2005, will be held at the Egret Himeji, Hyogo, Japan, from July 26 to 30, 2005. http://xrm2005.spring8.or.jp/

# SPRING-8 RESEARCH FRONTIERS

SPring-8 Research Frontiers 2003 has been published.
Online request form is available at:
<a href="http://www.spring8.or.jp/e/publication-e.html">http://www.spring8.or.jp/e/publication-e.html</a>

### **Probe into Ancient Bronze Mirrors**

M. Hirokawa of Sen-oku Hakuko Kan Museum in Kyoto, Dr. N. Umesaki of JASRI/SPring-8, and their collaborative research group performed a high-precision X-ray fluorescence analysis on silver (Ag) and antimony (Sb), trace constituents contained in ancient bronze mirrors, using the SPring-8 Engineering Science Research Beamline, BL19B2, to find clues about production sites of the mirrors. (This experiment was conducted as a priority research proposal under the Trial Use Program.)

While a number of analyses have been carried out to measure the content of main components of the mir-

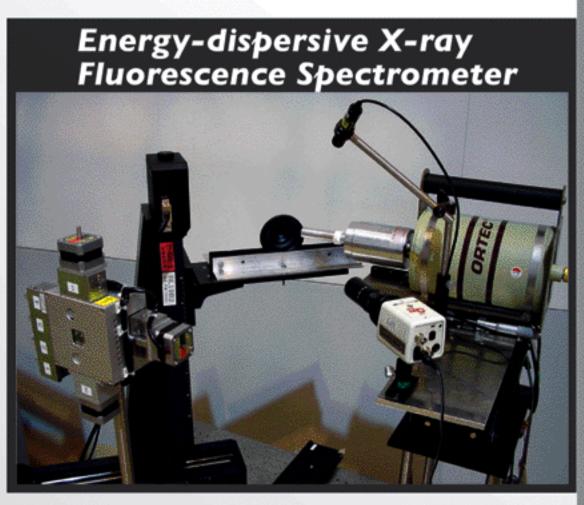
rors such as copper or tin, the group went further to measure trace constituents; They measured Ag and Sb content of 95 ancient bronze mirrors made in China and in Japan, which are kept in the museum, and made a distribution map by the Ag and Sb content. The map shows that these bronze mirrors can be classified into four clusters by production site and period: 1. China, 3rd century BC; 2. China, 2nd century BC; 3. China, 1st century BC to 3rd century AD; 4. Japan, 3rd to 5th century AD.

The round bronze mirror called "Sankakuen-shinju-kyo," the back of which has a triangle-cross-sectional edge and is decorated with design of some deities and sacred animals (see picture), is worthy of special mention; All of the mirrors were unearthed in Japan but their origins have been unidentified. However, the experiment demonstrated that six of eight Sankakuen-shinju-kyo mirrors are classified into the Chinese origin (group 3 above) and the other two into the Japanese origin (group 4 above). The results imply that the Sankakuen-shinju-kyo mirrors have two or more origins providing important clues as to where and how they were produced.

## Engineering Science Research Beamline, BL19B2

BL19B2 is a medium-length hard X-ray bending magnet beamline designed for engineering science research. This beamline aims to promote the use of synchrotron radiation among industrial users. The main techniques available on this beamline are: X-ray absorption, diffraction, scattering, and imaging; X-ray fluorescence analysis is also available.







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