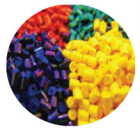
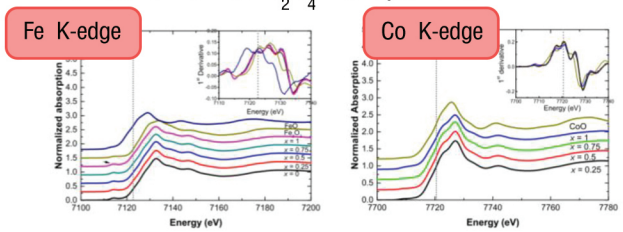
Research Application

- **Gems, Mineral and Archaeology:** Determine coloring agents and phases in materials.
- **Biological and Medical Sciences:** Examine transition metals in soil, water, or plants.
- **Catalysts:** Study of oxidation states, coordination numbers, bond lengths, neighboring atoms, and chemical structures of central atoms.
- **Ceramics and Polymer:** Study the impurities in polymeric structure, improve product quality, and develop new products.

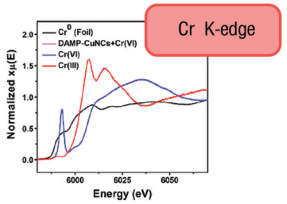
Research Highlights

- Study the effect of the Mg addition on the cation distribution of $CoFe_2O_4$ nanoparticles



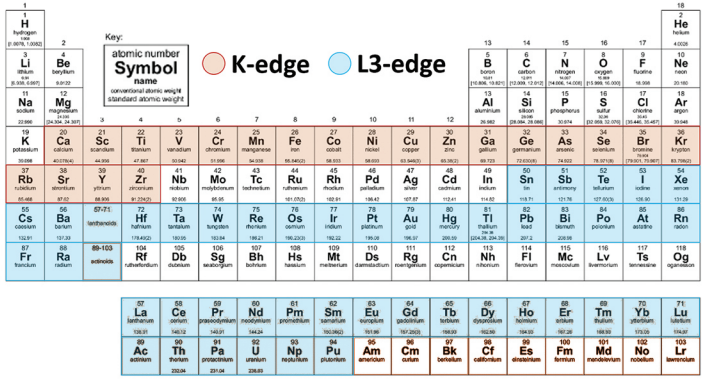
P. Chirawatkul, J. Alloy. Compd., 697 (2017) 249-256

- Detection of oxidation state of Cr ions after the addition of a trace level of CrO_4^{2-} into low concentration DAMP-CuNCs



Khonkayan, K. et al, Microchim Acta, 184 (2017) 2965-2974.

Measurable Elements at BL1.1W



Siam Photon

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EN

BL1.1W: MXT

Multiple X-ray Techniques

Synchrotron Light Research Institute (Public Organization)

Technical Specifications

Radiation Source:
Multipole Wiggler

Photon Energy Range:
4-18 keV

Photon Flux:
10^{7}-10^{10} phs/sec/0.1%bw (at 100 mA)

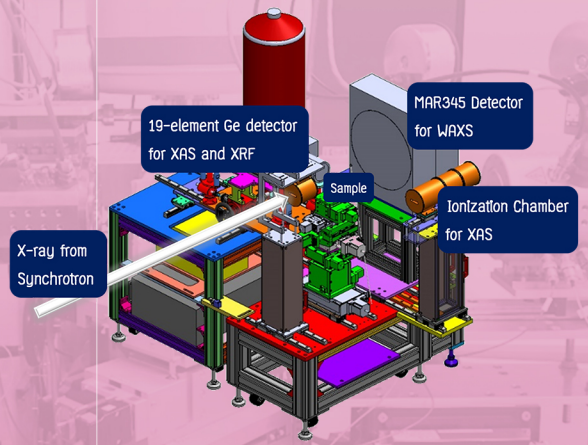
Energy Resolution:
10^{-4}

X-ray Beam Size:
6 mm (H) x 3 mm (V)

X-ray Techniques:
- X-ray Absorption Spectroscopy (XAS)
- X-ray Fluorescence (XRF)
- Wide Angle X-ray Scattering (WAXS)
- X-ray Powder Diffraction (XRD) (end of 2018)

Detectors:
- Transmission XAS: Ionization Chamber
- Fluorescence XAS and XRF: 19-element Ge detector
- WAXS: Image Plate detector (MAR345)

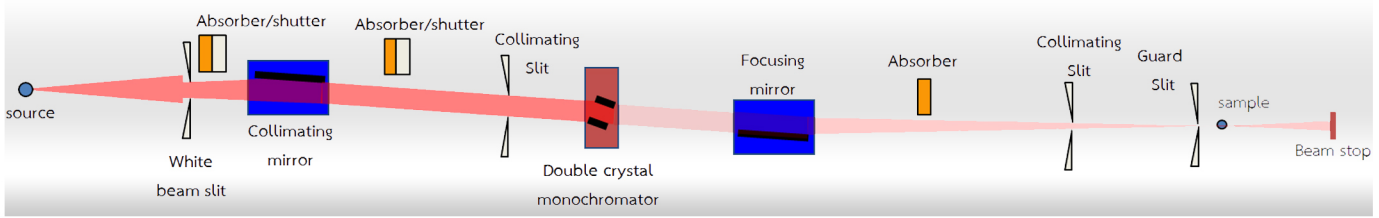
End-Station Layout



Brief Information

BL1.1W is operated on a 2.4 T Multipole Wiggler (MPW). The X-ray beam is optimized by a vertical collimating mirror (CM) and a toroidal focusing mirror (FM). The x-ray energy is scanned by using a fixed-exit double crystal monochromator (DCM) equipped with a pair of Si (111) crystals. The end-station is dedicated to various X-ray techniques including X-ray Absorption Spectroscopy (XAS), X-ray Fluorescence (XRF), Wide Angle X-ray Scattering (WAXS), and X-ray Diffraction (XRD). All experimental techniques can be requested within the same proposal.

BL1.1W has been operational since November 2016, and since January 2017, under collaboration with Khon Kaen University (KKU). The beamtime at BL1.1W is divided equally between SLRI users and lecturers or researchers from the KKU. All users can submit their beamtime proposal via the SLRI website.

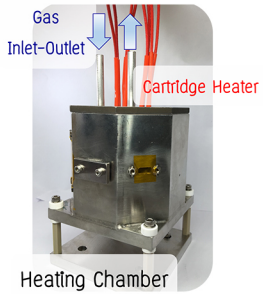


Beamline Layout (side view)

XAS

XAS is employed to study chemical and local structures of absorbing atoms. It is a non-destructive chemical analysis which can be carried out on various materials despite their low concentration (> 100 ppm). Samples can be measured in transmission or fluorescence modes or both simultaneously.

A heating cell is available for in-situ experiments to study the change of oxidation states or local structures as a function of temperature. The temperature program can be controlled in 3 modes, (1) continuous heating, (2) step-wise heating, and (3) step-wise heating-cooling cycles, in the range of 30-750°C. During the process, oxidizing (O_2, air) or inert (He, Ar, and N_2) gases can be fed into the heating chamber.



XRF

XRF is a non-destructive experimental technique for elemental analysis. A detection limit down to 50 ppm could be achieved. The analysis can be done qualitatively or quantitatively.

WAXS

The crystallinity and crystal structure of materials can be investigated by the WAXS technique. The technique is based on an analysis of Bragg peaks scattered by the samples at wide angles. At BL1.1W, the angular coverage is 5-70