

Potential Environmental Applications by Medium Energy Micro-probe Beamline Proposed in SSRF Phase-II Project

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Abstract

There are low levels of pollutants in the environment with a certain potential harmfulness. A medium-energy x-ray spectroscopy beamline is proposed in SSRF Phase-II Project and μ -XRF method will be realized. For the design indicators, the energy resolution ($\Delta E/E$) is 2×10^{-4} @ 2.5 keV and the photon flux is 1.5×10^{12} phs/s @ 2.5 keV (after K-B mirror focusing). The focused spot size will be $6 \times 2 \mu\text{m}^2$ @ 2.5 keV (K-B mirror) and $0.3 \times 0.2 \mu\text{m}^2$ @ 2.5 keV (small K-B mirror) respectively. The combination of high-brightness, sub-micron X-ray beams, nondestructive method and high sensitivity detectors are able to analyze environmental pollutants on the micro-scale, especially on sulfur and phosphorus compound. The beamline energy range is from 2 to 16 keV, covering most pollutant elements of K or L absorption edge in the field of the environmental science, such as copper, zinc, lead, cadmium, chromium, mercury and arsenic, etc. The detection capability of ppb level can be provided for accurate detection of the metals. XAS and XRF analysis can be carried on the end station, such as XANES, TEY, TXRF, and so on. At the end-station there are equipped the liquid cell, the device for high temperature and pressure (600K, 4MPa), and different gas supplies and safe exhaust, eg. for H_2S . For the experiments to study chemical catalyzer, a low temperature sample holder and the helium chamber will be equipped. Similar beamline on Medium Energy XAFS research are Diamond-I18, APS-2-ID-B and ESRFID-21 beamline.

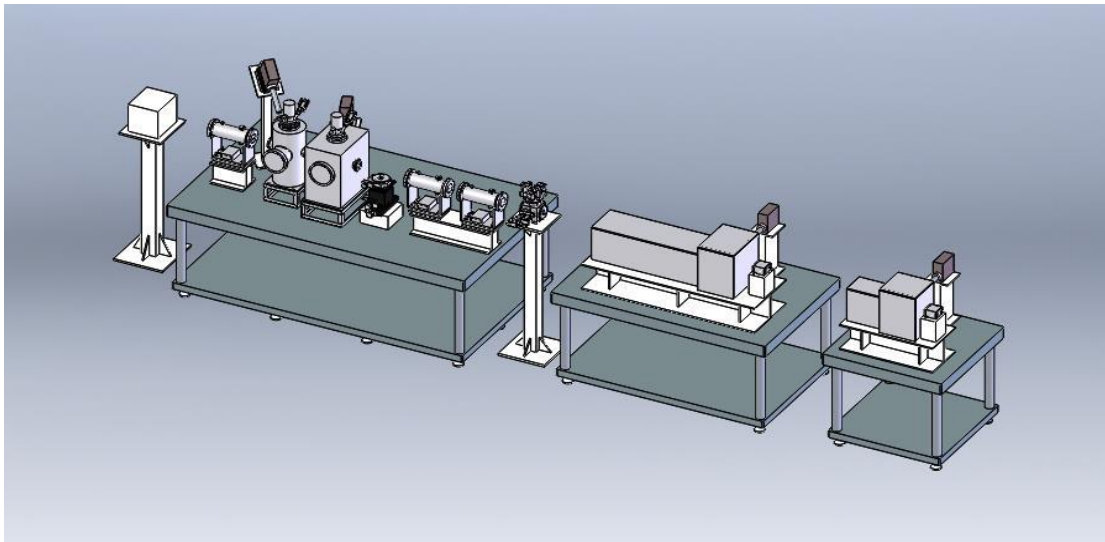


Figure1: Schematic diagram of the end-station at the medium energy beamline