XAFS/XRF Beamline at SESAME: First Monochromatic Light in the Middle East

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The International Center for Synchrotron-light for Experimental Science and Applications in the Middle East (**SESAME**) is established in Jordan. Its mission is to promote international collaboration in the Middle East and the Mediterranean region using synchrotron light for basic and applied research in physics, chemistry, biology, materials science, environmental and medical investigations, archaeological studies and other research areas of relevance to the region. The centerpiece of SESAME is an advanced synchrotron light source that is being constructed and to be operated by Member States of SESAME with the support of the international community.

XAFS/XRF Beamline is the first beamline being constructed at SESAME. It is based on the donated Helmoholtz Zentrum Dresden-Rossendorf beamline, originally installed at the European Synchrotron Radiation facility in Grenoble, which has been adapted to the characteristics of SESAME. This beamline is optimized for X-ray spectroscopic studies in all fields of science and for in situ studies. In terms of synchrotron equipment, the priority established by the objectives defined by the communities is the combination of x-ray absorption fine structure (XAFS) and x-ray fluorescence (XRF) techniques.

Within the beamline optics hutch, the white light is collimated by a double coated (Si and Pt) mirror (depending on the energy range), converted to a monochromatic beam by a double-crystal monochromator [Si(111) or Si(311)] running either in channel-cut or fixed-exit mode, and then vertically focused by a second mirror. Using a sagitally-focusing second crystal in the monochromator and the vertically focusing mirror, a spot-size of about 0.5 x 0.5 mm^2 can be achieved. With the energy range covered by the monochromator and the other optical components, including Be windows, the K-edges of elements from Ti to Sn and the L-edges of elements from Cs to Cm can be investigated for a photon energy raging from ~4.5 to 30 keV.

In addition to a brief technical description of the beamline concept, the physical principles underlying the method together with the information it can provide will be illustrated. As an illustration, some results of studies carried on the XAFS/XRF beamline will be shown.