

REALTIME XRF AND XRD IMAGING –THE INSTRUMENTATION AND THE APPLICATIONS

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The present talk describes novel powerful imaging for X-ray fluorescence (XRF) and X-ray diffraction (XRD). So far, the scanning-type imaging has been widely used in those techniques. Though recent progress in high-spatial-resolution imaging using synchrotrons is significant, there have been a clear limit; because of the step-scan, the imaging requires a long measuring time. In many scientific applications, X-ray imaging that are much more rapid, e.g., capable of high-speed resolution rather than high-spatial resolution, have been demanded. It is possible to do X-ray imaging without performing any scans. Here, the method uses quite a wide beam, which illuminates the whole sample surface in a low-angle-incidence arrangement (0.5~3 deg). The detector used is a CCD camera working at 30 fr./sec, equipped with a collimator inside, and the distance between the sample surface and the detector is set extremely close, in order to enhance both spatial resolution and efficiency. Note that the imaging is done with one shot. In the case of XRF imaging, distinguishing elements are required and, therefore, most of the experiments were performed with monochromatic or quasi-monochromatic X-rays. The procedure for XRD imaging uses a combination of exposure and incident X-ray energy scan (or just tuning). Since the present experiment employs a fixed small-angle incidence and also a fixed diffraction angle of around 90 deg, the diffraction plane here is inclined at about 45 deg from the surface of the specimen. By scanning the energy of the incident X-rays, one obtains a diffraction peak, which corresponds to the lattice spacing. Further instrumental details and many applications will be presented.

References

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