# X-ray fluorescence spectroscopy and trace element analysis using an x-ray microprobe

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X-ray microprobe system at BL39XU has both wavelength dispersive (WD) and energy dispersive (ED) spectrometers for X-ray fluorescence spectroscopy and analysis [1].

Fig. 1 shows Fe Kα and Kβ XRF spectrum of stainless steel foil measured with the WDS using a flat Si(111) analyzer crystal and a PSPC. The obtained energy resolution was 100 eV with this case, and the energy resolution of 16 eV was obtained by employing longer sample-PSPC distance. The energy resolution of the spectrometer is mainly determined by the spatial resolution of the PSPC and the further improvements are being carried out for better energy resolution and lower background.

Fig. 2. shows line scan image of a single crystal of synthetic diamond grown under high pressure with metallic solvent of $Fe_{55}Ni_{29}Co_{16}$. As reported previously [2] Ni is selectively dissolved into {111} growth sector, and its concentration is around 30 ppm. Ni XRF image show two {111} growth sectors and one {100} growth sector between them, and Fe image shows that Fe is concentrated into the boundary of the growth sectors. As averaged Fe concentration is less than 2 ppm, it has been difficult to discuss about the distribution of Fe. The brilliant undulator radiation has realized spatially resolved analysis of trace element whose concentration is less than 1 ppm.

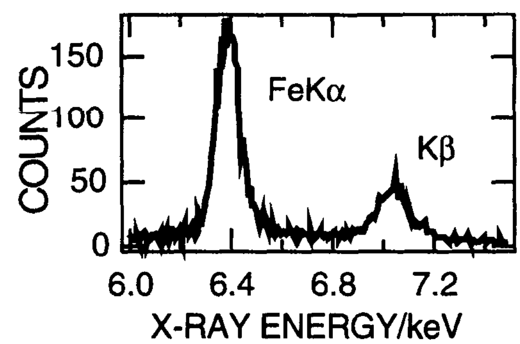


Fig.1. XRF spectrum of Fe Kα and Kβ obtaied with the WDS.

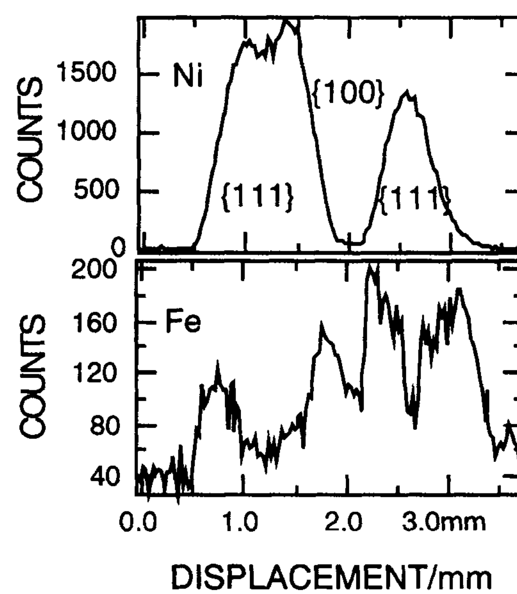


Fig.2. Line scan image of a synthetic diamond crystal with Ni and Fe XRF signals.

References
1) S. Hayakawa et al., Proc. of SRI97 in press.
2) S. Hayakawa et al., Trans. Mat. Res. Soc. Jpn., 14B, 1559-1562(1994).