





- [1] *A. Sammar et al.*, C. R. Acad. Sci. Paris, t. **315**, Série II, 1055-1060 (1993).
- [2] *M. Fialin et al.*, X-ray Spectrometry **25**, 60-65 (1996).

## **Multilayer monochromator with improved resolution and low background for the soft-x-ray domain**

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The standard multilayer monochromators used in soft-x-ray fluorescence and microanalysis suffer from a poor resolution and a high level of background associated with the specular reflection. We propose a new type of multilayer monochromator which overcomes partially these drawbacks. This monochromator consists in a lamellar grating etched in the multilayer structure and working in the zeroth order according to the principles given in Refs.[1] and [2]. Shortly, one can say that the existence of large grooves in the multilayer structure lightens the diffractive medium; it results:

- an increase of the penetration of the incoming wave and consequently a reduction of the bandwidth improving the spectral resolution.
- a decrease of the mean density of the medium leading to a reduction of the specular reflectivity.

We have fabricated a multilayer mirror with 50 Mo/Si bilayers of period  $d=8.7$  nm. The mirror has been etched according to a lamellar profile with a period  $D = 1.5 \mu\text{m}$  and a ratio of the multilayer pitch to the period  $D$  equal to 0.2. The technologies involved are UV lithography and reactive ion etching. The reflectivity of the multilayer mirror and of the multilayer grating has been measured at 1500 eV using the synchrotron radiation of Super-ACO. A large decrease of the specular component has been observed together with a reduction by a factor 5 of the bandwidth in the first diffraction order. The results are presented in the figure below.