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X-ray fluorescence in the SEM with a stub target

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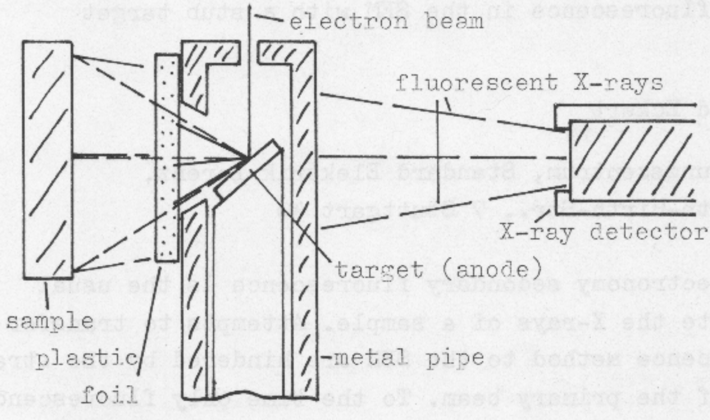
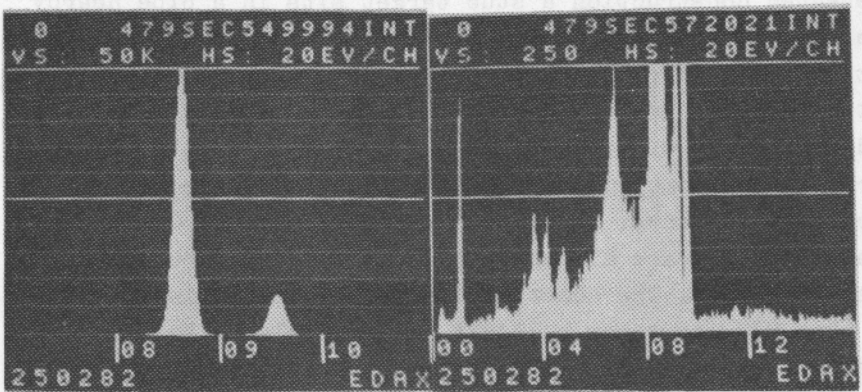
In X-ray spectronomy secondary fluorescence is the usual way to excite the X-rays of a sample. Attempts to transfer the fluorescence method to the SEM are hindered by the stray electrons of the primary beam. To the time only fluorescence by a thin metal foil was proved to be successfully. In the presented construction a stub target sits in a pipe nearby the sample. A window in the pipe closed by a plastic foil lets pass the X-rays but stops the electrons. The resulting ratio peak to background of the sample X-rays is in the order P/B = 1000, compared with P/B = 20 by electron excited X-rays. The improved P/B results in a lower detection limit for trace elements, nearly in the range of ppm. Otherwise trace elements are hidden in the statistic fluctuations of bremsstrahlung. The construction is simple and inexpensive, so that SEM users may build it for themselves. Exchange of the construction in the SEM is made in a few minutes, the analysis to search trace elements in nearly ten minutes. Here a larger aperture (1 mm Ø) for the primary beam is used.



X-ray fluorescence in a SEM with a stub anode



Spectrum of a zinc sample at 1 uA, 20 kV, Mo-target. left: energy-range from 7 to 11 keV, full scale 50000 counts. right: the same spectrum from 0 to 16 keV. Full scale now 250 counts. In the range from 10 to 16 keV the background reaches 12.5 counts, resulting a P/B = 4000.