DIFFERENT APPLICATIONS OF POLYCAPILLARIES TO X-RAY SPECTROSCOPY

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Recently, the capabilities of the x-ray fluorescence (XRF) and micro-x-ray fluorescence spectroscopy (μXRF) were expanded by the use x-ray lenses. At present, most of the x-ray lenses used in XRF experiments with conventional and non-conventional sources are mainly glass capillaries and polycapillaries.

Glass capillaries are small tapered tubes in which photons travel along the capillary by total reflection on the inner wall. Polycapillaries are more complex systems formed by thousands or, even, millions of monocapillaries that accept photons from an emitting point and concentrate the emerging photons in a focal spot. Semi-lens polycapillaries or double-focus polycapillaries are used in different geometries.

Semi-lens polycapillaries are special lenses than collect photons from a focal spot and produce an emerging parallel beam, and conversely, collect photons from a parallel beam and concentrates the photons in a focal spot. These kinds of lenses are particularly appropriated to perform a variety of experiments because their capability of producing a homogeneous beam with very low divergence.

In this work we present different examples of applications of polycapillaries to several x-ray spectroscopy techniques using both conventional x-ray soruces (x-ray tubes) and synchrotron radiation.

Some examples are presented about the typical use of polycapillaries, which is spatially resolved analysis (linear or 2D). The confocal geometry is discussed and 3D-surveys are shown. In addition, the possibility of performing the so-called energy dispersive x-ray diffraction is presented and some examples are shown. Finally, the TXRF technique is implemented using polycapillaries and a comparison of detection limits with other configurations of TXRF is presented.