

A high performance HAPG ring optic for X-ray Emission Spectroscopy

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X-ray emission spectroscopy (XES) is an upcoming method for the investigation of the electronic structure of chemical compounds. Typically the chemical shift of the $K\beta$ -multiplett is analyzed. XES, therefore, requires a high spectral resolution and is mainly performed at synchrotron radiation facilities.

We developed a spectrometer for XES experiments with an X-ray tube as source. As analyzer we used a von-Hamos type ring optic, which uses Highly Annealed Pyrolytic Graphite (HAPG). This optic combines high efficiency with a good spectral resolution [1]. With the first optic of this kind, we achieved a spectral resolving power of slightly below $E/\Delta E = 2000$.

Recently a second instrument of that type went into operation. One of the major goals was to maximize the spectral resolving power. With a re-designed optic we achieved a resolving power of 4000 – still in first order of reflection, preserving a high reflectivity.

In this contribution, we will discuss the design considerations of the optic and aspects of manufacturing. We will show the results of its characterization and spectra obtained.

[1] L. Anklamm, Ch. Schlesiger, W. Malzer, D. Grötzsch, M. Neitzel, and B. Kanngießer, "A novel von Hamos spectrometer for efficient X-ray emission spectroscopy in the laboratory", *Review of Scientific Instruments* 85, 053110 (2014)