

New concepts of compact high sensitivity, high resolution diagnostic tools for spectroscopic, angular and polarization measurements in the EUV, SXR, and x-ray range using synchrotron radiation

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We have developed and tested new concepts of experimental instrumentation for diagnostics of synchrotron radiation and studies of interaction of synchrotron beams with matter (atoms, molecules, microstructures, surfaces, solids) based on both glass capillary converters (GCCs) and multilayer mirrors (MLMs) or crystals [1-3], in which the optical GCC device provides guiding, focusing, and polarization analysis of short wavelength radiation with a large bandwidth, and the MLM or crystal optical elements are used for dispersing, focusing, and polarization sensitive studies of radiation within a narrow bandwidth. In particular we report here for the first time about the development and test of such new optical diagnostics devices: (i) GCC converters for time-resolved x-ray imaging measurements, (ii) compact polarimeter-spectrometers with GCC and MLM (crystals) for measurements of polarization and spectral characteristics of short wavelength radiation, and (iii) compact high sensitivity extreme ultraviolet (EUV) spectrometers with GCC enhancement and coefficient about 10-30 ($60 \text{ \AA} < \lambda < 600 \text{ \AA}$). This type of micro-instrumentation is very suitable also for 2D and 3D and multiparameter applications.

[1] V. Kantsyrev et al., *Appl. Phys. Lett.* **66**, 3567 (1995).

[2] V. Kantsyrev, R. Bruch, *Rev. Sci. Inst.* **68**, (1997) to be published

[3] R. Bruch et al., *Rev. Sci. Inst.* **68**, (1997) to be published