

**Multi-crystal modular x-ray spectrometer for diffraction studies using SR**

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Experimentation with modern X-ray diffraction methods requires fast assembly of different sophisticated X-ray optical schemes. To solve this problem, we suggest a set of elements united in the modular X-ray spectrometer. The set permits easy implementation of two- and three-axis X-ray diffraction schemes, multiple- diffraction layouts with two-dimensional collimation of the incident beam, surface diffraction schemes, and experiments with X-ray standing wave method. The instrument can be used to study single crystals, heteroepitaxial structures, multi-layer systems and superlattices, and crystals subjected to different treatments (mechanical treatment, ion implantation, etc.). The main elements of the spectrometer are: the two-circle goniometer with the vertical axis, the one-circle goniometer with the horizontal axis, the four-circle research goniometer, and different slit systems. All units except the four-circle goniometer can be mounted on two parallel optical guides. The four-circle goniometer is a stand-alone unit consisting of an Eulerian cradle mounted on a two-circle goniometer. All rotations are driven by stepping motors via worm gears. On axes where fine (to 0.1 arc sec or less) angular positioning is desirable, torsion-element-based rotation is used; it is driven via piezo drivers. A program package was developed to control the experiments. The software is based on the modular principle providing for fast implementation of application programs suited for specific X-ray diffraction methods.