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The polycapillary optics application for double diffraction line intensity increase

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Nowadays X-ray absorption spectroscopy is widely used in the X-ray structural analysis [1] and can be applied to elemental analysis of substance [2]. A special group of absorption analysis methods imply measurements of the radiation absorption coefficients at a few energy lines that allow estimating a number of investigated object characteristics. Implementation of these methods requires X-ray beams with line spectrum, which is a sum of a two or more energy line. Authors propose [3] to use combination of X-ray tube and a set of crystal monochromators, which are reflect X-ray lines with different energies in the one direction, to produce such beams. This can be used as an alternative to currently using radioactive sources. In the report possibility of use X-ray polycapillary half-lens in order to increase intensity of a couple X-ray lines produced by this scheme is considered and experimental investigation results are shown. In the experiment, X-ray tube (Oxford Series 5000) with molybdenum anode was used as a source and set of crystals, which were silicon (100) and (111), were used to produce line spectrum. The obtained results approve the possibility to increase X-ray lines intensity to more than one order of magnitude.

References

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