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Reflection optimization of nano-multilayer X-ray mirrors in three-edge energies: Cr-K α , Co-K α , and Ti-K α

H Ghavidel¹, H Khosroabadi^{2,3}, and M Otoukesh¹

1. Department of Energy Engineering, Sharif University of Technology, Tehran, Iran
2. Department of Physics, Sharif University of Technology, Tehran, Iran
3. SESAME synchrotron, Allam, Jordan

E-mail: hossein.khosro@sesame.org.jo

Abstract

In this paper, a practical simulation method for optimizing of x-ray reflection of nano-multilayer mirrors in three different edge energies: Cr-K α , Co-K α , and Ti-K α is discussed in order to obtain the most reflection based on quarter-wave thickness method (QW). In this method, the reflected x-ray will have a constructive interference, and a peak, called Bragg peak, will appear in reflection curve when the thickness of the layer is an odd multiple of the quarter-wave thickness. The quarter-wave thickness is dependent on the angle and energy of the entrance photon beam. In the mentioned edge energies, for different nano-multilayer mirrors, and for incident angle ranges from 0.5 to 8 degrees, the QW thickness for each layer is estimated and the Bragg peak reflected intensity was simulated for each angle by the IMD computational code. The details shows that the optimal reflection is accessible by plotting Bragg peak reflection curves based on the related angles.

Keywords: X-ray reflectivity, nano-multilayer mirror, quarter-wave method

For full article, refer to the Persian section