

Roles of X-ray Optics in the Next Generation X-ray Source

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X-ray optics for x-ray free-electron lasers (XFEL) are very important for beam handling/diagnostics, and, potentially, for FEL generation. In particular, special characters of XFEL such as high spatial coherence, short pulse, and peak brightness, should be well considered in the design work.

For beam handling (*i.e.*, monochromatization, focusing, filtering, *etc.*), conventional optical components are still important. However, higher qualities are required to avoid unwanted speckles under coherent illumination [1,2] and to keep high brightness. Diagnostics of coherence properties, temporal profile, and photon statistics [3] give crucial information for accelerator operation as well as for user applications. Shot-by-shot and non-destructive methods are highly desirable. X-ray monochromator is a key issue to realize a seeded XFEL such as the two-staged configuration [4].

In order to meet these severe requirements, several R&D programs utilizing presently available synchrotron sources are in progress. Achievements and current problems are discussed.

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