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Energy distribution of photoelectrons from the first mirror of a synchrotron radiation beamline

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Photoelectrons (PEs) are emitted from the surface of the first mirror of a synchrotron radiation (SR) beamline when irradiated with white x rays. It has been reported that the PEs transfer heat to the chamber walls and mirror holder, inducing thermal drift of the mirror and consequently causing beam position and energy drift. We designed a copper shield which covers the entire mirror surface to absorb the PEs. However, it was difficult to install due to its large size and hindered observation of the mirror surface, thereby making the maintenance of the mirror more difficult. To better understand the phenomenon of PE emission and to design a smaller and more efficient shield, we have conducted spectroscopic analysis of PEs involved in heat transfer using a retarding field energy analyzer at the beamline BL-11A of Photon Factory. The analyses revealed that the energy distribution of PEs is largely independent of the beam's angle of incidence on the mirror surface, and that most of the emitted power originates from PEs with energies in the 1-2 keV range, although more than half of the emitted PEs have energies below 100 eV.

Footnotes

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