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Thermal analysis of front end vacuum components & mirror for IVU24 beamline at the Korea-4GSR

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Currently under construction in Ochang, Chungcheongbuk-do, Korea-4GSR is a 4GeV, 4th Generation Synchrotron Light Source. The front end is being designed to pass the powerful synchrotron radiation generated by the insertion device. High heat load components have hence been customized to meet the requirements of beamline users and account for the thermomechanical limits of materials. In the analysis of the 4GSR beamline device, the values of IVU24, which has the largest beam intensity, were used, and the specifications for securing the safety of the front end device were determined. In the case of devices that come into direct contact with the beam, the flow rate and cooling passage structure were determined so that the convection coefficient could be increased under conditions that did not cause significant vibration. And cooling system optimization analysis was conducted to minimize the slope error of the mirror, and as a result, partial cooling according to the footprint size resulted in the best slope error value. In this paper, we describe the characteristics and analysis results of the front end and mirror.

Footnotes

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