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Study on Cs-Te Photocathode with Protective Film for Performance Improvement of KU-FEL

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A new 1.6-cell photocathode RF gun has been installed to improve the performance of Kyoto University free electron laser (KU-FEL). A test operation using a copper cathode has been completed, and the electron bunch charge of 60 pC with 120 bunches in a macro-pulse was obtained. However, due to the copper cathode's low quantum efficiency, the electron beam performance could not reach the target of 1 nC and 200 bunches. From the performance of the photocathode drive laser, the required quantum efficiency is about 0.1%. Therefore, a Cs-Te with CsBr protective film* is a good candidate for our project since it can have enough high quantum efficiency with a reasonable lifetime. A Cs-Te and CsBr protective film deposition system has been developed and test measurement has been performed. In the presentation, we will report the characteristics of the deposited Cs-Te photocathode with CsBr protective film.

Footnotes

*Dinh C. Nguyen et al.(1999). Nuclear Instruments and Methods in Physics Research. A 429 125-130

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