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Development and Test Results of Multi-Alkali Antimonide Photocathodes in the High Gradient RF Gun at PITZ

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Multi-alkali antimonide photocathodes can have high quantum efficiency similar as UV sensitive (Cs2Te) photocathodes, but with the advantages of photoemission sensitivity in the visible region of the light spectrum and a significant reduction in the mean transverse energy of photoelectrons. A batch of three KCs2Sb photocathodes was grown on molybdenum substrates via a sequential deposition method in a new preparation system at INFN LASA. Afterwards, the cathodes were successfully tested in the high gradient RF gun at PITZ. This contribution summarizes the experimental results obtained in both the preparation chamber and the RF gun. Based on those findings, we are now optimizing the recipe of KCs2Sb and NaKSb(Cs) photocathodes for lower field emission and longer lifetime, and the measurements for the latest photocathodes with the improved recipe are also presented.

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