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Development of an X-band Field Emission RF Gun at Tsinghua University

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An X-band field emission rf gun has been developed at Tsinghua university. It is composed of 3 cells and a pluggable cathode. The first cell is designed to work at TM02 mode to eliminate the rf power leaking. The high-power testing was processed on the uprated T-POT. After conditioning of around 107 pulses, the peak accelerating gradient of the gun achieved 200MV/m and a stable emission current of around 3mA was detected. The cathode after conditioning was observed by WLI and SEM. Both craters and bulges were observed on the cathode surface, and their distribution is closely related to the electric field intensity and surface fluctuation caused by machining. An electron image system based on this gun will be built in our future plans.

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