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## The effective way of improving the performance of a novel multipacting cathode with high current density

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The possible ways of improving the performance of a novel multipacting cathode is numerically investigated by using Particle-In-Cell (PIC) method. Firstly, the prototype configuration and physical model of the novel multipacting cathode are briefly introduced. Secondly, by using the self-programmed 2.5D PIC code, possible ways of improving the performance of the novel multipacting cathode are detailed studied. The simulated results could be concluded as follows. Prolong the length of multipacting cathode could partly improving the cathode performance due to the longer interaction range of multipacting. Increasing the secondary electron yield of material could partly improving the cathode performance due to the higher yield of secondary electrons. Improving the axial electric-field could partly improving the cathode performance due to the higher impact energy. Improving the radial electric-field could partly improving the cathode performance due to the stronger suppression of space-charge field. Thus, synchronously improving the axial and radial electric-field could partly improving the cathode performance. Improving the axial magnetic-field could not certainly improving the cathode performance due to lower impact energy of electron. The most effective way of improving the cathode performance of the novel multipacting cathode is synchronously improving the axial and radial electric-field and the axial magnetic-field. Through this way, the output current could be notably increased. Meanwhile, the flight time and travel distance of electron could be shortened but the impact energy is not changed. Thereby, the electrons could be in low energy-spread and good emittance.

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