

STUDY OF URT-1M ACCELERATOR IN SUBMICROSECOND OPERATION

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In recent years, the concept of surface radiation sterilization (SRS) has been actively developing, the essence is the effect of an electron beam only on the surface layer of the object being irradiated. This approach is promising in many applications, such as the treatment of various food products: grains [1], eggs [2], lumped meat and feeds [3]. The main advantage of SRS is the ability to localize changes in the product in a narrow surface layer (tens to hundreds of microns), which is contaminated by various microorganisms. At the same time, the main part of the product is irradiated only by bremsstrahlung, the level of absorbed doses in which is tens of thousands less than on the surface. This allows to maintain not only the nutritional value of the main part of the product, but also the vital ability of seeds or eggs.

At the same time, the requirements for maximum electron energy for such accelerators are significantly reduced to 0.5 MeV, and the presence of low-energy electrons in the spectrum becomes useful. These electrons intensify the irradiation of the surface layers and reduce the output of bremsstrahlung, the only limitation being their high absorption in the output foil, and increase the thermal load on it.

The purpose of this work was to investigate the operation of the URT-1M [4] accelerator with a power system without SOS switch. The approaches used in the high-voltage pulse generation system of this accelerator allow generating a pulse with an amplitude of up to 500 kV, a duration of ~ 450 ns and a supply repetition rate up to 50 pps during discharge of the second circuit capacitor.

It was found that in this mode, an accelerator with a metal dielectric cathode works stably at a charging voltage of up to 35kV (accelerating ~ 350 kV). Further increase of voltage is limited by breakdown of through vacuum insulator with shielding of dielectric surface [5].

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