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INCREASING THE UNIFORMITY OF RADIATION TREATMENT UNIFORMITY OF OBJECTS USING MODIFIER PLATES

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Today more than 70 countries around the world have radiation processing centers for treatment of food and medical products [1]. Such radiation processing centers increasingly use electron accelerators, due to the higher dose rate received by the facility compared to authorized radioactive sources and, as a consequence, a higher rate of food processing [1].
During treatment with accelerated electrons, heterogeneity of irradiation of objects is inevitable [2]. For most medical products uniformity of irradiation of about 50% is sufficient. But for other categories of irradiated objects, such as transplantation equipment, pharmaceuticals, chilled meat and fish products, it is necessary to ensure the uniformity of irradiation of at least 80% [1-3].
It is possible to use electron energy variation over several irradiation sessions to increase the uniformity of dose distribution over the volume of treated objects [4]. However, a repeated irradiation increases treatment time and cost. In addition, for some treated objects it is not recommended to stay outside the cooling chambers for a long time. Therefore, it is an important to develop a method that would allow to increase radiation treatment uniformity in one irradiation session, which is the subject of this study.
This paper proposes a method for modifying beam spectrum using aluminum modifier plates, which allows to increase the irradiation uniformity up to 0.97 for the radiation treatment of parallelepiped-shaped objects with a mass thickness up to 3.125 g/cm2 by accelerated electrons with energies up to 10 MeV. The possibility of applying the method to the irradiation of spherical and cylindrical objects is shown. The experiment showed that the proposed method of electron beam modification is applicable to radiation treatment of objects at industrial electron accelerators UELR 10-15-C-60 [6] and ILU-14 [7] to increase the uniformity of irradiation.
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The speaker is a student or young scientist

Yes

Section

1. Nuclear technology and methods in medicine, radioecology

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