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Response of HR-GaAs:Cr sensors to subnanosecond γ- and β-ray pulses

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Currently, semiconductors with high atomic number Z arouse strong interest in construction of sensors with X-ray spectrum. The most prospective materials are presented by elements from the group AIIIBV. Gallium arsenide compensated with chromium (HR-GaAs:Cr) is one of these materials and exhibits unique characteristics. Sensors based on HR-GaAs:Cr demonstrate high efficiency. The response of HR-GaAs:Cr sensors to subnanosecond γ - and β - ray pulses of 25÷45 keV from accelerator of runaway electrons are described in this research. The samples have symmetric structure metal-semiconductor-metal. The active area of the samples was 6.25÷9 mm2 and the thickness of sensitive layer was 150÷500 μm. Experimental characteristics of pulses were compared with theoretical estimations. An optimal thickness of sensitive layer of HR-GaAs:Cr sensors was determined. This helps to obtain the highest possible value of speed-of-response ≤ 1ns.
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