SIMULATION OF CHARGE COLLECTION EFFICIENCY AND SIGNAL TO NOISE RATIO OF X-RAY SENSORS BASED ON CHROMIUM-COMPENSATED GALLIUM ARSENIDE*

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The paper presents the results of charge collection efficiency and signal-to-noise ratio simulation for sensors based on chromium-compensated gallium arsenide (HR GaAs:Cr). It has been established by simulation that the dominant noise that reduce the energy resolution of HR GaAs:Cr sensors are shot and generation-recombination noises. It is shown that as the sensor area decreases, the contribution of these noises to the total noise decreases and the noise of the electronic path becomes dominant.

Analysis of the calculation results allows to conclude:

- the maximum signal-to-noise ratio for sensors with an area of 0.1×0.1 mm^2 exceeds the same parameter for sensors with an area of 3×3 mm^2 and is 26 and 13 for sensors with an area of 0.1×0.1 mm^2 and 3×3 mm^2, respectively;

- value of signal-to-noise ratio decrease with increasing sensor thickness at other things being equal.

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