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Pixelated CdZnTe detector based on Topmetal-IIa sensor

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Topmetal-II- is a direct-charge collecting pixel sensor with the Equivalent Noise Charge(ENC) of 13.9e- in the room air. A pixelated CdZnTe detector based on Topmetal-II- sensor works at a low bias voltage of -2V due to leakage current saturation. In order to improve the bias voltage of the crystal to achieve higher spatial resolution, as well as to keep the low noise, Topmetal-IIa has been designed. The new sensor has the same array scan module with Topmetal-II-, but three different sections of the charge-collection electrode named Topmetal and the same layer metal surrounding the electrode called Guardring. Section A has the opening exposed electrode and the Guardring covered by insulating layer, which is the same as Topmetal-II-. Section B has the both opening exposed electrode and Guardring. Section C has the opening exposed Guardring and the electrode covered by insulating layer. Preliminary experiments show that Topmetal-IIa sensor has low ENC similar to Topmetal-II-, and the pixelated CdZnTe detector could work with Topmetal-IIa sensor could work at a bias voltage up to several hundred volts as to achieve high spatial resolution.

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