

Study of Radiation-Response Properties of Natural and Synthetic Type IIa Diamond Detectors

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Diamond has the highest radiation-damage level among radiation-detector semiconductor materials. Besides, low carbon nucleus charge,  $Z=6$ , provides tissue equivalence of diamond detectors. However, essential restrictions are imposed on production of natural-diamond detectors by extremely low final yield of selection procedure and corresponding expensiveness of high-quality type IIa natural diamonds. The solution of this problem could be found through the development of single-crystal synthetic-diamond detectors.

Basic radiation-response properties of high-pressure high-temperature single-crystal synthetic-diamond (SD) detectors and natural-diamond (ND) detectors made of extremely low nitrogen content (type IIa) material were comparatively studied under X-ray, UV, and alpha-particle irradiation.

**Important note:**

The Abstract has not yet been completed by now. Here, the additional text will be printed soon, after editing.

The difference in detector performance could be explained in terms of presented model of charge carrier injection and transport in diamond.

Fig. 1. Planar SD detector spectral response.

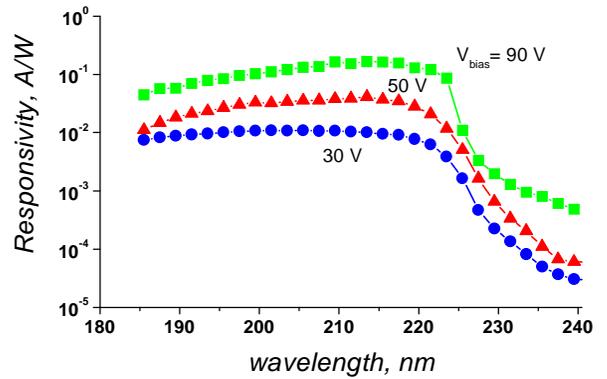


Fig. 2. Planar ND detector spectral response.

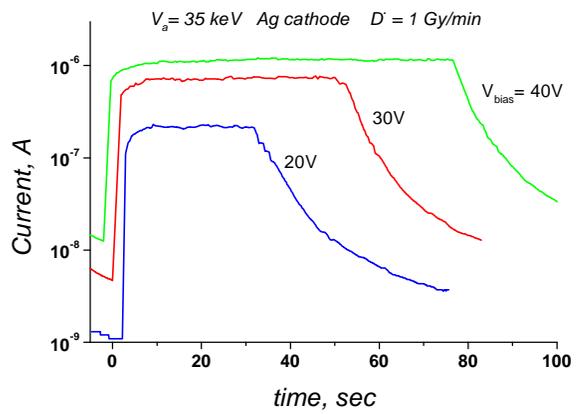


Fig. 3. SD detector step X-ray radiation response.

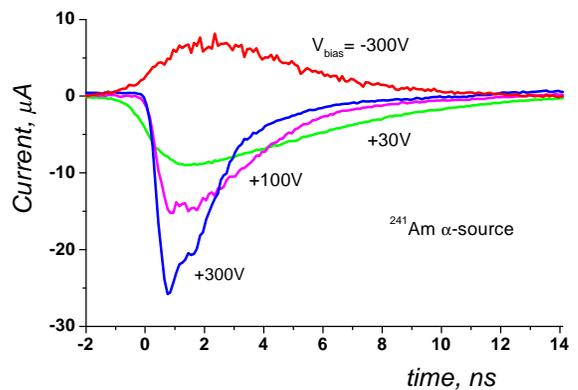


Fig.4. ND detector current response to 5.5 MeV  $\alpha$ -particles.