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Performance of four CVD diamond radiation sensors at high-temperature

Ionising radiation detectors based on wide band-gap materials have the potential to operate at temperatures greater than 200 ℃. Such detectors are important in applications such as monitoring near reactors and in deep oil and gas well bore-hole logging. We discuss the development of alpha particle detectors, based on CVD diamond, which operate with good charge collection efficiency and energy resolution at temperatures up to 225 ℃. Four nominally identical commercial, electronic grade, CVD diamond sensors have been coated with a thin metal conductive layer in our laboratory and then attached to ceramic PCB. We present the I-V characteristics, the CCE and the energy resolution for alpha particles from a mixed Pu-Am-Cm source, for the four sensors operating at temperatures from 20 to 250 ℃. A comparison of Monte Carlo simulations of the energy spectra is made with experimental data.

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