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First electrical and soft X-ray characterization of ultra-shallow junction nLGADs from IMB-CNM

n-type Low Gain Avalanche Detectors (nLGADs) have already demonstrated excellent performance for shallow-penetrating radiation detection, including low-energy photons down to the deep-ultraviolet (DUV) spectrum, as well as low-energy protons and ions. They are specifically designed to achieve high gain only when radiation penetrates the near-surface region (approximately 1–2 μm). We report on a new variation of this technology from the latest IMB-CNM run, the ultra-shallow junction (USJ-nLGAD) design, which includes pixellated devices with pitches ranging from 55 to 440 μm. We present their first electrical characterization through IV and CV measurements. In addition, we show the first results in the soft X-ray range (280 eV–1 keV) obtained at the SOLARIS National Synchrotron Radiation Centre, demonstrating that our devices exhibit clear responsivity to this photon energy range. Along with voltage scans, we investigated the gain suppression effect through photon flux–dependent measurements, confirming that high charge injection screens the surface electric field, lowering the gain.

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