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Testing a New Technology for Producing High Purity Germanium Segmented Detectors

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Hyperpure Germanium (HPGe) gamma-ray detectors are fundamental tools for nuclear physics thanks to their exceptional energy resolution but have some well-known drawbacks. We present here recent advancements in HPGe-contacts technology based on the innovative pulsed laser melting (PLM) method. PLM promotes an efficient diffusion of high dopant concentrations into the melted HPGe subsurface layer, followed by a fast epitaxial regrowth. The resulting layer is perfectly pseudomorphic to the Ge substrate. While producing highly doped n+ and p+ junctions, PLM does not contaminate HPGe crystal due to the very low and surface-limited thermal budget. The resulting n+ or p+ contacts are both very thin (around 200nm), segmentable and stable against thermal cycles. After introducing the method, different results obtained with HPGe segmented detector prototypes will be shown, both before and after induced neutron damage and annealing.

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