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Planar silicon sensors for the CMS Tracker phase II upgrade

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The CMS tracker collaboration is aiming to identify the best suited silicon materials and sensor thicknesses for future tracking detectors for the high luminosity phase of the Large Hadron Collider (HL-LHC). Therefore, a large material investigation and irradiation campaign was initiated. A variety of silicon $p-in-n$ and $n-in-p$ test-sensors made from Float Zone (FZ), Magnetic Czochralski (MCz) and epitaxially grown (Epi) materials were manufactured in different sensor thicknesses by one single industrial producer (Hamamatsu Photonics K.K.). The samples have been irradiated with 1 MeV neutrons, protons and subsequently with both particle types corresponding to fluences as expected for the positions of detector layers in the future tracker (up to $\Phi = 10^{16} \text{ cm}^{-2}$). All materials have been characterized before and after irradiations, and throughout an annealing treatment. The measurements performed on the structures include electrical sensor characterization, measurement of the collected charge injected with beta sources and laser light and bulk defect characterization. In this talk, latest results from the campaign are presented.

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