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TPA-TCT a High Resolution Technique to characterize small-size pixels

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Very recently, an innovative Transient Current Technique was introduced where the free charge carriers are created in a Two-Photon-Absorption (TPA) process induced by a focused femto-second laser pulse with a wavelength of 1300nm. The fact that in a TPA process the absorption of the light depends on the square of the intensity of the light beam used for the current generation allows a localized TPA-induced electron-hole pair creation in a micrometric scale voxel centered on the laser waist. As a consequence, this new technique opens the possibility to carry out a 3D mapping of the sensor's space-charge properties with micrometric resolution.

Due to its intrinsic spatial resolution, the TPA-TCT technique is a very appropriate choice for the characterization of the alterations of the sensor's active volume induced by the ionizing radiation; in especial manner, for the case of partially depleted sensors as it is the case of the carrier collecting n-well implemented in HV-CMOS sensors.Using the TPA-TCT technique on a HV-CMOS device the deep n-well has been accurately measured being able to to determine its effective doping concentration for the first time in this kind of depleted CMOS devices achieving a unprecedented insight on the doping level and dimensions of the deep n-well suitable for a better understanding and optimization of the device design.

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