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CdTe Medipix2 and Medipix3 Pixel Detectors: Material Characterization, Technology and Device Performance

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The development of pixel detector arrays for different types of applications requires sensors with high efficiency and high homogeneity. The efficiency is strongly depending on the absorption of the detector material. High-Z semiconductors like CdTe-based materials are the most promising ones. The recent progress of CdTe crystals and the availability of interconnection technology open the possibility of processing CdTe detectors with small pixels down to 55 μm and high efficiency for X-ray energies above 20 keV.

CdTe and CdZnTe detectors have been studied for several years. In the last years the technology for hybridization of CdTe based pixel detectors was developed for small pixel pitches. Different types of pixel detectors have been produced using our own technology with small pixels down to 55 μm and high connection density up to 65,000 pixels. CdTe wafers up to 3 inch diameter have been used for processing the pixel detectors. Detectors with a size of 14x14 mm² and 42x28 mm² were developed using the Medipix2.

The assemblies were tested with different radiation sources, X-ray tubes and by Synchrotron radiation. The obtained results regarding the efficiency, the homogeneity and the spectroscopic features are discussed in comparison with the data of material characterization before and after processing. Preliminary results of the performance of the pixel detector systems with Medipix3 will be presented.

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