Development of radiation detectors with high Z material

Prof. Dr. Michael Fiederle, FMF, University of Freiburg (Germany)

The recent progress of CdTe and CdZnTe crystals and the availability of interconnection technology open the possibility of processing CdTe detectors with small pixels down to 55 µm in combination with high efficiency for X-ray energies above 20 keV. Hybrid systems with the state of the art readout electronic these assemblies open new possibilities for medical imaging.

At the Freiburger Materialforschungszentrum CdTe, CdZnTe and GaAs detectors have been studied for several years. These studies include the crystal growth, material characterization and processing of radiation detectors. In the last years the technology for hybridization of CdTe and GaAs 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. Detectors with a size of 14x14 mm² and 42x28 mm² were developed using the Medipix2 and recently Medipix3 electronics.

The talk will give an overview about the status of high-Z detector materials and related detector technology. The performance of Medipix2 and Medipix3 assemblies will presented regarding the efficiency, the homogeneity and the spectroscopic performance.