



ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE
ÚSTAV TECHNICKÉ A EXPERIMENTÁLNÍ FYZIKY

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POZVÁNKA

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Medipix3 CT with Si, CdTe and GaAs Sensors for Material Sciences

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Abstract: Silicon is the standard semiconductor sensor material for pixelated X-ray detectors. Due to its homogeneity and stability it provides a high detector and image quality. However, because of its low Z, Si has a low X-ray absorption efficiency at energies above 20 keV and is therefore not optimal as sensor material for medical imaging and non-destructive high Z material analysis. The compound semiconductor sensor materials GaAs (31, 33) and CdTe (48, 52) have a higher Z than Si (14) and therefore a better X-ray absorption efficiency. The recent progress in growing and processing of these materials improved their detector quality and make them interesting as efficient sensor material for X-ray imaging applications. For investigations on these sensor materials they were bump bonded to Medipix readout chips. The Medipix has 256 x 256 pixels with a pixel pitch of 55 x 55 μm^2 and is a photon counting semiconductor detector which features adjustable energy thresholds allowing multispectral X-ray imaging. A Medipix3 CT X-ray measuring station was built up for small animal X-ray imaging and non-destructive material analysis. The combination of the low energy threshold (~ 4 keV) of the Medipix3 with its multispectral capability enables tomographic investigations on objects with low absorption contrast. The advantage of photon counting, multispectral detectors like Medipix3 for material sciences will be presented here as well as a comparison with a scintillator-based CT.

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