

Medical Imaging Applications - the Underlining Technology

Speaker: Dan Negrea – AEMtec GmbH, Berlin, Germany

E-Mail: Dan.Negrea@aemtec.com

Abstract

Presently four key detection technologies are dominating the medical imaging market: the CT detection, the PET detection, the MRI and the Ultrasound. The fundamental differences between these technologies consists in the very nature of the transducers or sensors used in each type of application.

Besides this first functional layer – the transducers – the manufacturing technologies used to assemble these transducers in modules, directly useable in the different devices, are facing largely identical challenges, the main ones being the accuracy of the assembly, the planarity of the surface in case multiple tiles are being used, the low-stress assembly and of course the long-term reliability. In case multiple tiles are used and the final image is calculated through interpolation, it is a huge advantage to have as few as possible rows of missing pixel to interpolate. This can be achieved through accurate tiling, for instance with an accuracy of $\frac{1}{4}$ pixel.

The planarity of the surface when tiling is involved, solves at least two key problems: most photonic sensors used in CT (in case they do not perform direct conversion), require a glued scintillator ceramic on top of the sensor. A uniformly thick layer of glue offers better sensitivity calibration and better interchangeability possibilities. The ideal sensor has a high sensitivity for the signal to be measured and is immune to other environmental factors. Real life is different: environmental factors like internal tensions in the chip may largely affect the performance of the used sensor. A stress-free assembly brings huge advantages in terms of thermal drift, gradient of sensing performance over the surface and long-term stability.

In Berlin we produced in the past 10 years hundreds of thousands of different types of highest-end sensors with very high yield and long-term reliability.