Ultra High Speed Multi-element SDD X-Ray Spectrometer with Improved Energy Response

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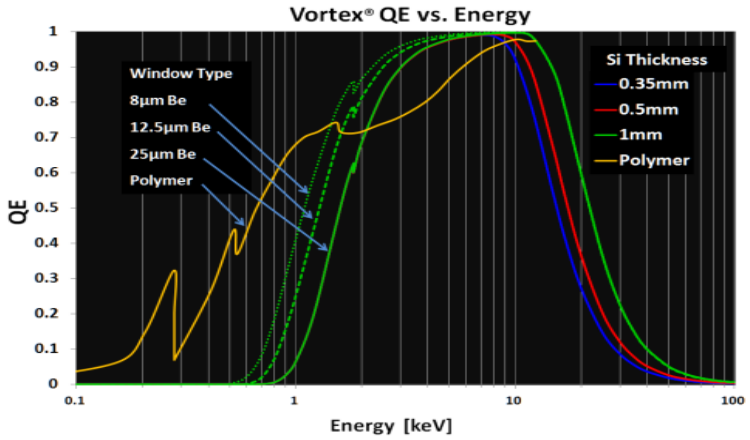
The state-of-art multi-element silicon drift detectors (SDD) with improved hard X-ray quantum efficiency (QE) are integrated with advanced front-end ASIC electronics. Figure 1 demonstrates that 1mm thick SDDs double the QE at 20 keV over standard 0.35 mm thick SDD. ASIC integrated SDDs give superior noise performance at very short shaping times. Resolution is better than 140eV up to 200kcps and better than 230eV up to 3Mcps with the latest adaptive pulse processing electronics. An extensive study of high count rate performance will be presented, including count rate linearity, signal throughput, stability of Peak position and resolution, etc. To even further increase in total count rate capability and detector solid angle, we have developed focused 3 elements, 4 elements and close packed 7 elements SDD spectrometers[1] as shown in Figure 2.



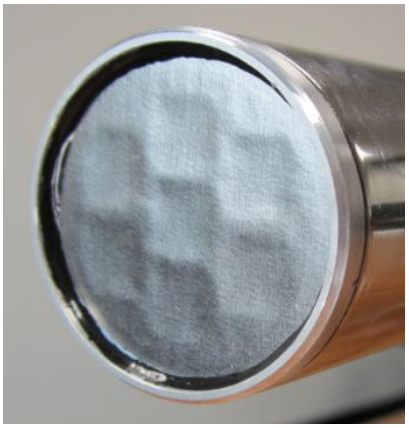


Figure 1. Quantum efficiency of various window and SDD thickness

Figure 2. Be window of a 7 element SDD

(1). S. Barkan, V.D. Saveliev, Y. Wang, et al. *Biol. and Chem. Res.* ***2015****,338-344*