Evaluation of Silicon Drift Diode Detectors for Fluorescence XAFS Experiments

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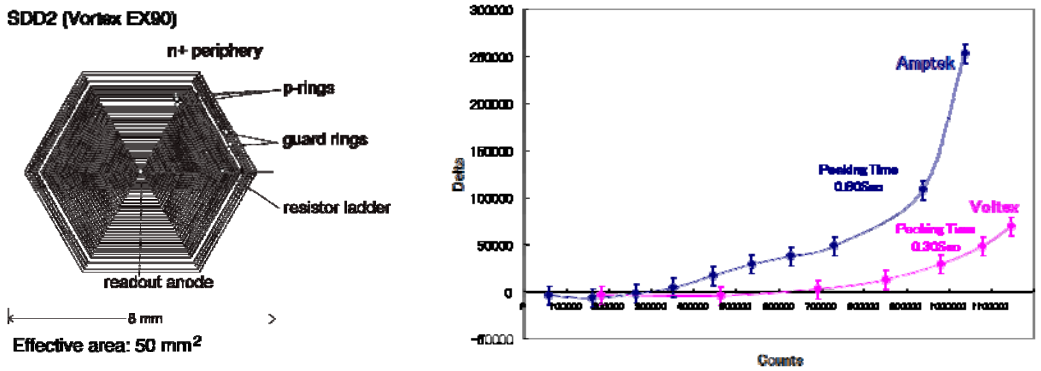
In our *in-situ* study using a microfluidic cell [1-3], XAS spectra for a limited reactor volume (500 micron diameter) are obtained by monitoring fluorescence x-ray. Position dependent measurement allows time-resolved study of chemical reaction over a wide range of time interval (within several tens of seconds). Here we report comparative evaluation of detector performance with respect to the energy resolution, energy shift and throughput for the two silicon drift diode (SDD) detector systems (Amptek XR100 and Vortex 60EX [4]) under the same condition with experiments [1-3]. Focused undulator beam at NW2A (AR, KEK) was used at the Se K-edge absorption (12 keV) for ZnSe nanoparticles. The effective area of SDDs is 9 mm^2 and 50 mm^2 respectively. The results indicate clear supremacy of Vortex SDD demonstrating the throughput performance reflects the peaking time of digital electronics, *i.e.*, 0.80 μsec *vs* 0.30 μsec. Both SDDs showed, however, excellent performance in peak energy shift and energy resolution. Practical linearity limit without dead time correction for XR100 and EX90 are 30 kcps and 75 kcps, respectively.



SDD geometry of Vortex EX90 (left) and nonlinearity for the two SDDs (right)

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[3] Z. Sun *et al*., J. Phys. Chem. C 113, 18608 (2009).
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