Solid-State Detectors for Wavelength Dispersive Spectrometers

Solid-State Detectors greatly improve the overall efficiency of the wavelength spectrometers on our electron microprobe. Traditional gas proportional detectors hinder the key feature of an electron microprobe: Trace element analysis that is cost effective and competitive with other analytical techniques.

Gas Proportional Detector Problems

- **X-ray counter saturation**
- **Higher dead time corrections**

These flaws contribute to slower analytical times and force the analyst to operate at lower currents. To compensate for this, we have equipped our instrument with patented solid-state detectors that have the following advantages over gas proportional counters.

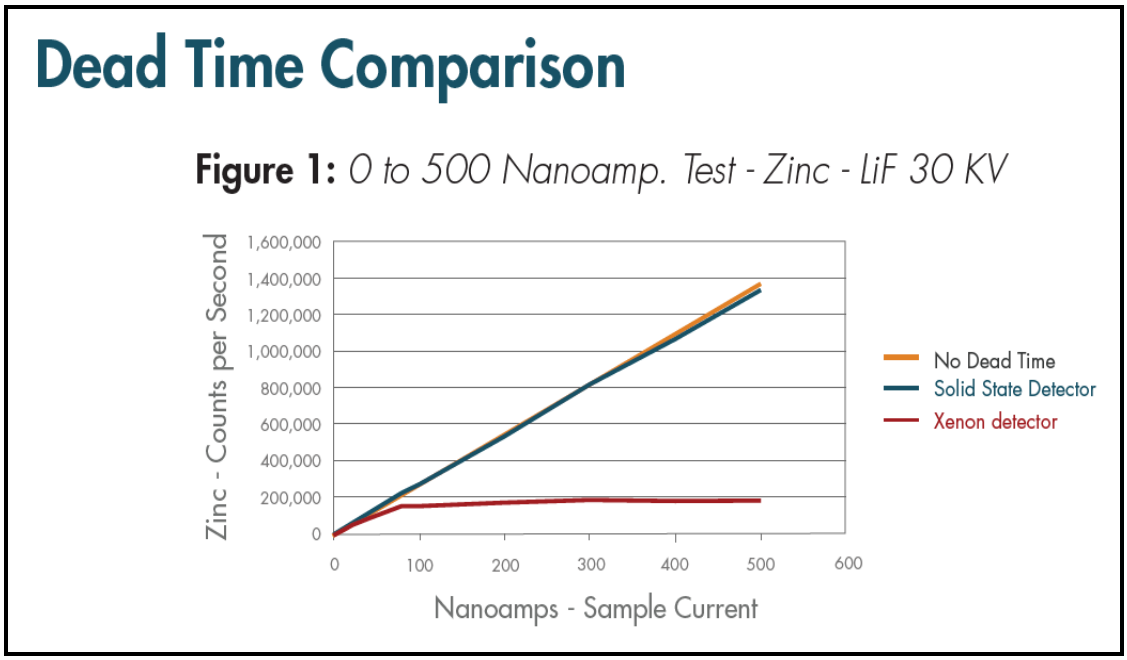

Figure 1: A solid-state detector can operate up to 500 nanoamps. with minimal dead time correction. The xenon detector saturates at 90 nanoamps.

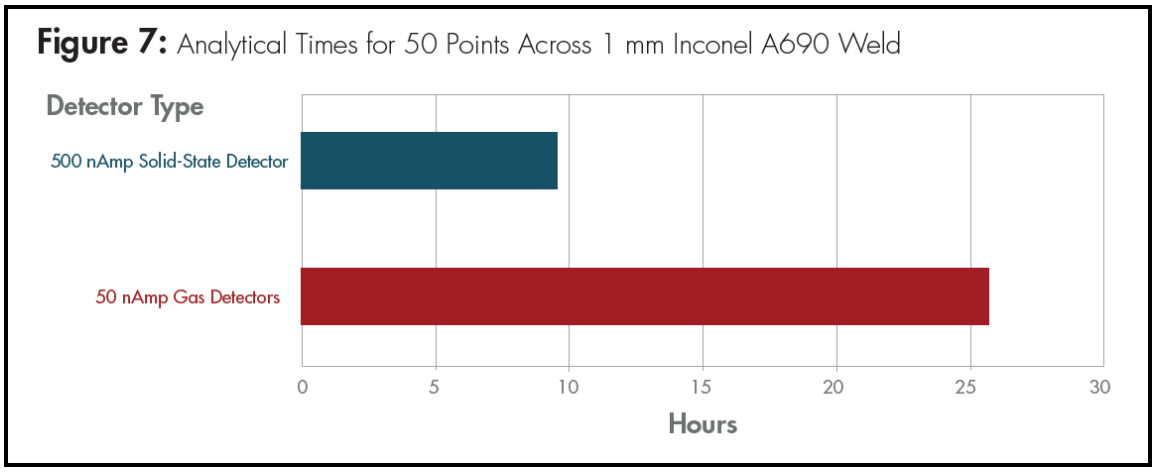

Figure 2: Time Comparison - 10 Elements (7 Trace) - 50 Points – 2.9 Times Faster – 500 nanoamps.

Advantages of Solid-State Detectors for WDS

- **Major increase in analytical throughput and efficiency**
- **Lower prices for clients**
- **Trace element standards can be used in a reasonable time to minimize ZAF corrections and improve accuracy.**
- **Dead Time corrections are 20 times smaller than gas detectors**
- **The detector and counting system approaches ideal operation between 0 and 500 nanoamps. of sample current**
- **Similar quantum efficiency to gas detectors.**
- **Larger choice of operating currents for the analyst.**

Figure 5: Table of Quantitative Results of Inconel A690 Weld Analysis

Analyzed

		Mg	Cr	Ti	Nb	Si	Ni	Mn	Mo	Fe	Al	Total
	Analyzed	0.0539	29.5008	0.3113	0.0443	0.0650	60.2269	0.2028	0.0445	8.7629	0.4218	99.634
Inconel A690 Specifaction	Minimum		28.00	0.20			58.00			1.00	0.15	
	Maximum	0.008	31.00	0.45	0.10	0.15		0.50	0.10	11.00	0.40	

Non-Analyzed

		B	C	N	Cu	P	S	Co
Inconel A690 Specifaction	Minimum	0.006	0.015					
	Maximum		0.025	0.030	0.100	0.010	0.002	0.020

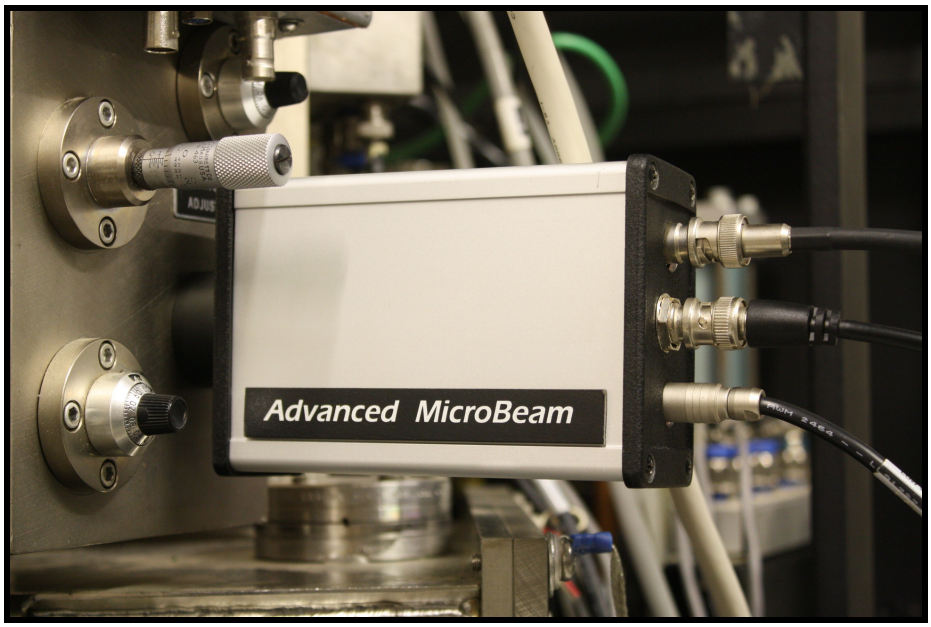

Figure 3: Solid-State Amplifier Mounted to Wavelength Dispersive Spectrometer