**Typical Steel Alloy Spectra**

For all measurements shown here, the detector was a 1st generation SDD, P/N GS13AMD-G3SP, with 7mm^2 active area, internal multilayer collimator, and a 1 mil Be window. The processor was an X123-SDD. The source was an Amptek Mini-X, Ag anode, operated at 30 kVp and 70 µA, with a 0,040" Al filter. The MP1 baseplate defined the geometry. T_{peak} was 9.6 µsec, ICR was ~6 kcps for a 10% dead time. Each spectrum was measured for 5 minutes.
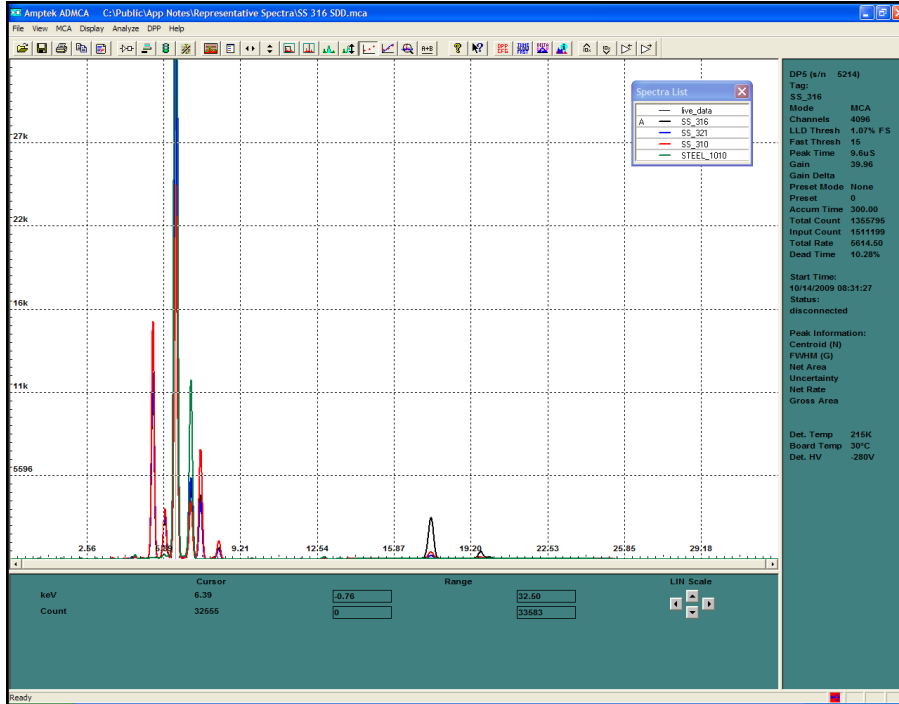
Linear plot of four steel alloys. The green trace is >99% Fe.
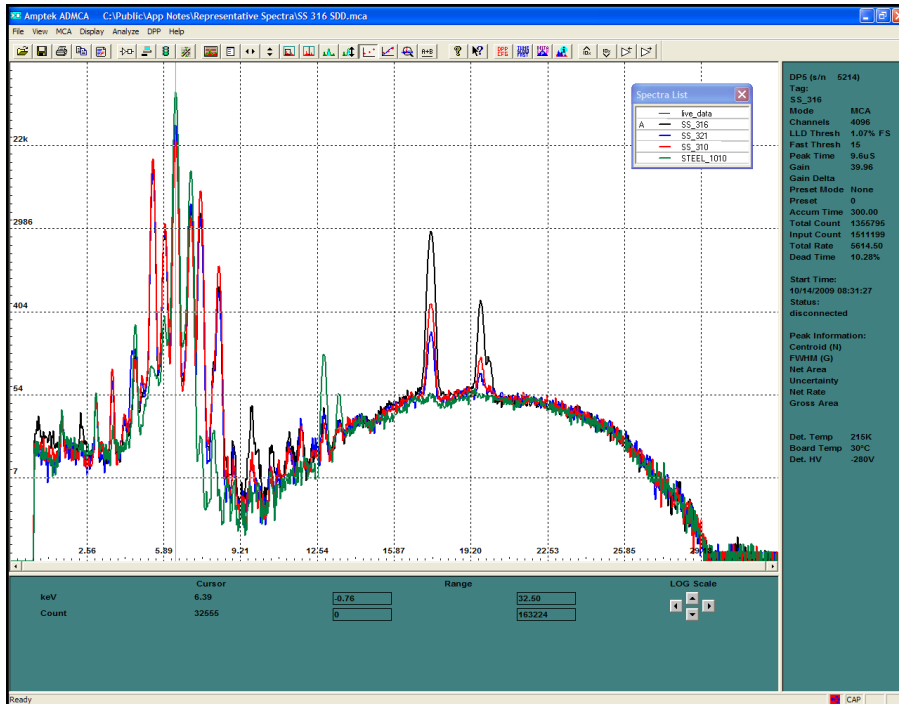
Log plot of the same four alloys.
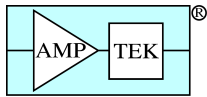
Targets

AISI 316				AISI 321				AISI 310		Low Alloy	
NIST SRM 1155				NIST SRM 1171							
SS 316 SDD.MCA				SS 316 SDD.MCA				SS 310 SDD.MCA		SS 1010 SDD.MCA	
C	0.046	+	0.001	C	0.067	+	0.001	C	0.02	C	0.08
Co	0.101	+	0.005	Co	0.10	+	0.01				
Cu	0.169	+	0.001	Cu	0.121	+	0.001	Cu	0.10		
Cr	18.45	+	0.05	Cr	17.4	+	0.1	Cr	25.32		
Fe	64.456			Fe	68.236			Fe	69.762	Fe	99.508
Mn	1.63	+	0.01	Mn	1.80	+	0.05	Mo	0.40		
Mo	2.38	+	0.01	Mo	0.165	+	0.005	Mn	1.72	Mn	0.39
Ni	12.18	+	0.05	Ni	11.2	+	0.1	Mo	0.40		
P	0.020	+	0.001	P	0.018	+	0.001	P	0.018	P	0.009
Si	0.502	+	0.005	Si	0.54	+	0.01	Si	0.54		
S	0.018	+	0.001	S	0.013	+	0.005	S	0.001	S	0.013
V	0.047	+	0.001	Ta	0.34	+	0.01				
Pb	0.001	+	0.001								

The targets for SS316 and SS321 were obtained from NIST, who provided uncertainties for the composition measurements. They are disks, 3.2 cm in diameter by 1.9 cm thick. The targets for SS310 and the low alloy steel were from a different vendor. The uncertainty in the composition is not known. They are plates, 0.062" thick.

Configuration

Configuration				Status	
COM Port	USB	Gate Input	Off	Device Type	DP5
Rise	9.6 usec	Preset	5 min	S/N	5214
Top	0.4 usec	Coarse Gain	38.18	Firmware	5.07
Fast Threshold	15	Fine Gaine	1.0466	FPGA	5.04
PUR Enable	PUR On	Input Polarity	Positive	Fast Cts	1,511,199
RTD Enable	RTD Off	Input Offset	0.922V	Slow Cts	1,355,795
RT Ratio	164.10%	Pole Zero	Off	Accumulation Time	300
RTD Slow Threshold	3%	Reset Lockout	410 uS	Dead Time	10.28%
Autobaseline	Off	TEC	213 K	HV	-280V
BLR	On DN:16 UP:4	HV	279.8V	TEC Temp	215K
Acquisition Mode	MCA	Preamp Power	8.5V	Board Temp	30 C
MCS Timebase	10 mS	Analog Out	Decimated Inpout		
MCA Channels	4096	Offset	0 mV		
Slow Threshold	1.07%	AUX	ICR		
Buffer Select	A	Audio	Off		

- The gain was set to give ~30 keV full scale, so all elements would be clearly seen.

- The number of channels was set to give ~10 channels FWHM at the lowest energies.

- The temperature setting here is appropriate for a lab with a good heat sink. If the system must operate at elevated temperatures, raise TEC to achieve regulation.

- The thresholds and input offset must be adjusted after the gain is set, with the tube turned off.

- It is important to keep Autobaseline turned off, acquisition mode on MCA, pole zero off, and reset lockout to something other than "Off".