	Initial Surface finish (grit)	E field to produce 100 pA field emission		
		Min	Median	Max
Bare Al #1	1200	3.06	3.52	3.70
Bare Al #3	1200	5.15	5.22	5.46
Bare Al #1 + IGP	1200	8.55	9.12	10.34
TiN #1	1200	8.77	9.63	11.68
TiN #1	800	8.58	9.00	10.49
TiN #2	1200	5.50	5.72	6.98
TiN #3	1200	8.00	8.24	9.23
TiN #1 + IGP	800	13.64	16.74	18.20
TiN #2 + IGP	1200	13.70	15.55	18.44
TiN #3 + IGP	1200	19.22	21.91	24.60

*** IGP = Inert Gas Processing**

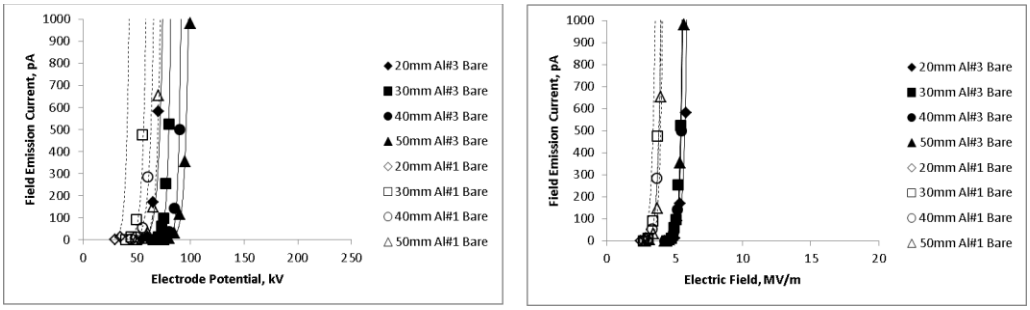

Figure 1: Comparison of two aluminum electrodes (#1 and #3) prior to coating with TiN. Aluminum electrode #2 was not evaluated prior to being coated by the vendor.

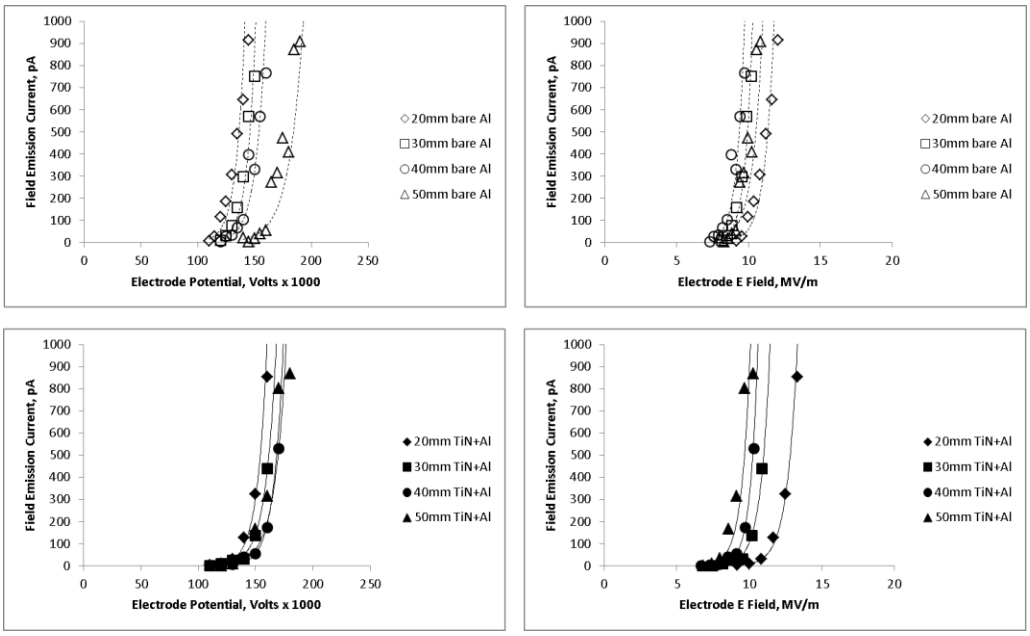

Figure 2: Al #1 – First run (1200 grit polish). This electrode sustained damage during the initial evaluation. The TiN coating was applied over the damaged areas. The field emission improved compared to the uncoated state, however multiple rounds of gas conditioning failed to improve upon the performance. Top: Bare Al surface after He processing (after damage was sustained). Bottom: After TiN coating over the damaged surface.

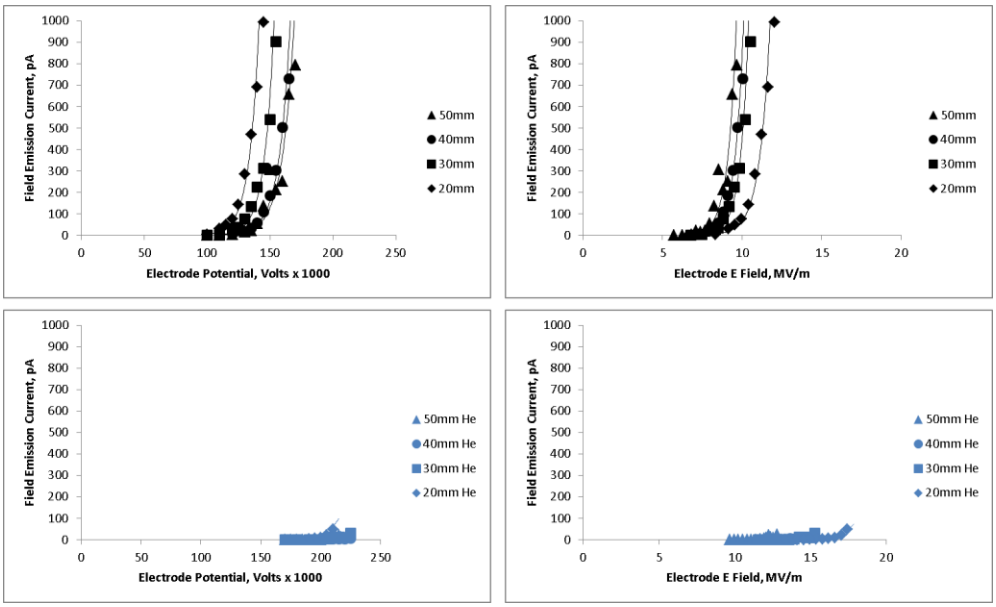

Figure 3: Al #1 – Second Run 800 grit polish + TiN coating (before & after He processing in HVTS 2). The damaged electrode #1 had the TiN coating removed. It was then repolished to an 800 grit finish, recoated with TiN, and revaluated before and after helium gas processing. Top: before He processing. Bottom: after He processing.

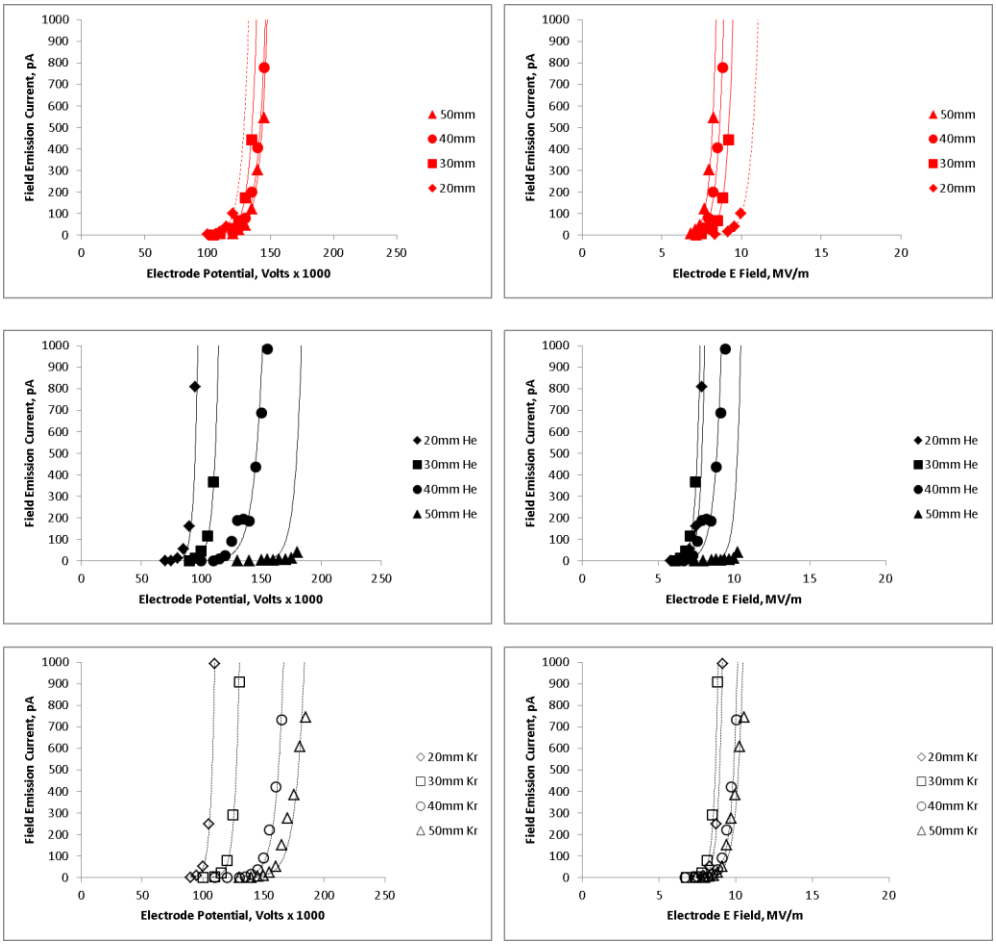

Figure 4: Al #1 – Second Run 800 grit polish + TiN coating. The electrode was moved into test stand #1, vacuum baked, and reevaluated. During the reevaluation damage occurred that resulted in degraded performance. Additional attempts at inert gas processing (using both He & Kr) were fruitless. Top: Before inert gas processing. Middle: After He processing. Bottom: After Kr processing.

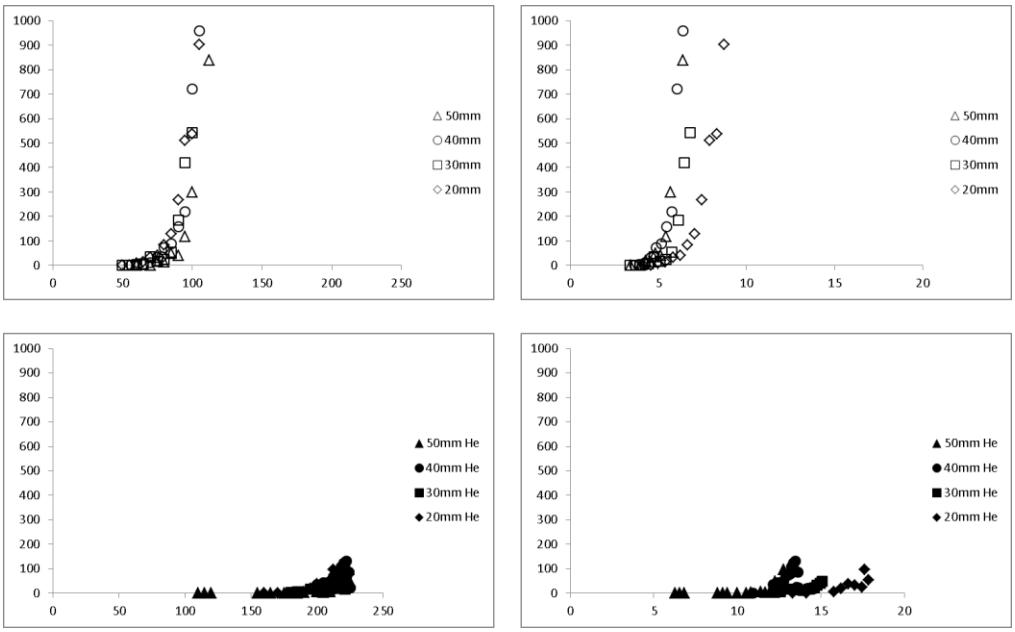

Figure 5: Al #2 with TiN coating before and after He Processing. A substantial improvement was noted after helium gas processing. Top: Al #2 after TiN coating applied to surface. Bottom: Al #2 with TiN coating after He processing.

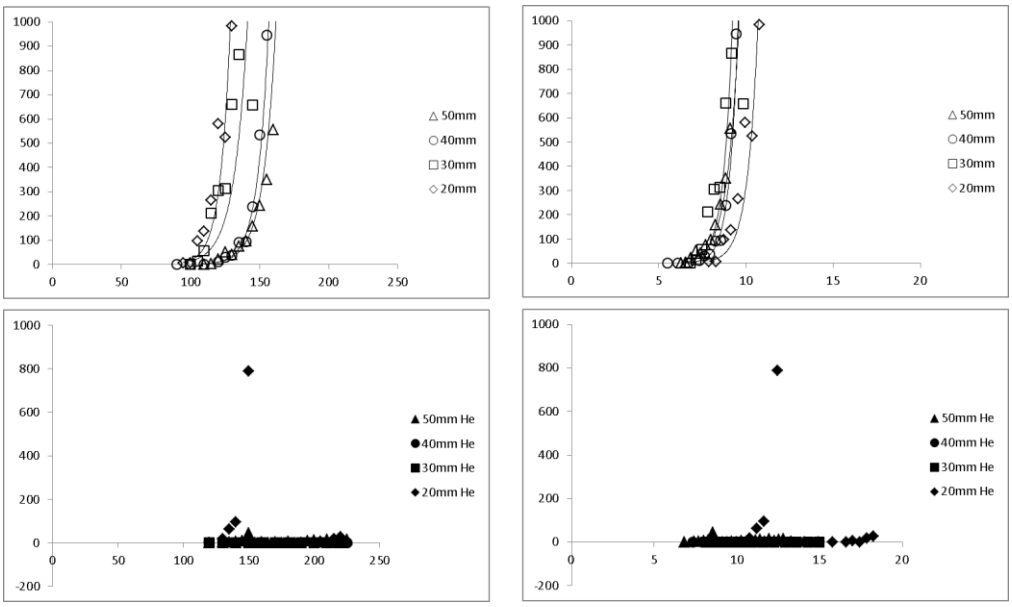

Figure 6: Al #3 - TiN coating before and after He Processing. At the 20 mm gap, a field emitter popped up, then subsequently disappeared between 125 and 150 kV. No further field emission was noted until the 215 kV level was reached. Top: Al #3 with TiN coating. Bottom Al#3 with TiN coating after He processing.