SIMCO ION™
An ITW Company

TECHNICAL NOTE

ESD Solutions Through Superior Emitter Point Technology

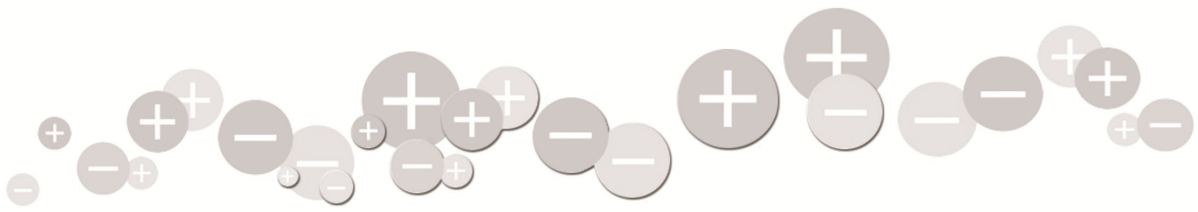
Ionization has been used for decades to reduce losses caused by static charges. Until 1984, ionizer emitter points were commonly made of stainless steel. When the semiconductor industry moved to production requiring ISO Class 4 (Fed Std Class 10) conditions, these stainless-steel emitter points were identified as an unacceptable source of particles. Pure tungsten and thoriated tungsten emitter point materials were substituted in 1985 as possible solutions to this problem. Further research indicated that these materials were generally acceptable in ISO Class 5 (Fed Std Class 100) conditions, but their tendency to produce episodic particle bursts was unsuitable in better quality environments. Another tungsten alloy was investigated and found to produce acceptably low particle levels without the particle bursts.

As the specifications for cleanrooms continued to improve, research in emitter point materials produced alternatives to tungsten-based materials. Machined titanium emitter points reduced the level of particles by almost an order of magnitude compared to tungsten, and they are the standard for most cleanroom ionization outside the semiconductor industry. In semiconductor manufacturing, the problem of "killer particles" remained to be solved. Any metallic particles falling on the wafer surface may be processed into the silicon and result in a defect site. The need to eliminate metallic particles from ion emitters was the impetus for Ion's patented single crystal silicon emitter points. Introduced in 1992, these points have reduced particle levels by a factor of 40 compared to tungsten and cannot produce killer particles.

Single Crystal Silicon

Simco-Ion's patented single crystal silicon emitter points represent the cleanest option available in the industry. Far exceeding ISO Class 3 (Fed Std 209e Class 1) cleanliness requirements, these non-metallic points produce no particle bursts and emit an average of less than 5 particles per cubic foot (less than 0.05 microns in size verified with condensation nucleus (CNC) and optical particle counters).

Electrode Type	Emitter point	
Class Compatibility	ISO Class 3 (Fed Std 209e Class 1) or better	
Particles – Average/Cu. Ft.	5	
Estimated Life	10-15 years (depending on maintenance and environmental conditions)	
Maintenance Interval	Recommended 3 months (depending on environmental conditions)	
Products	**22-0360** (.86"/2.18 cm) without sleeve	
	22-0365 (.58"/1.47 cm) ultraclean, sleeved	Current: Model 5225, 5685 Support: Model 4190, 5285, 5585
	22-0375 (.4"/1.02 cm) sleeved	For high-temperature ionizers
	22-0376 (.48"/1.21 cm) without sleeve, (.65"/1.65 cm) sleeved	Current: Model 4630 QuadBar



Machined Titanium

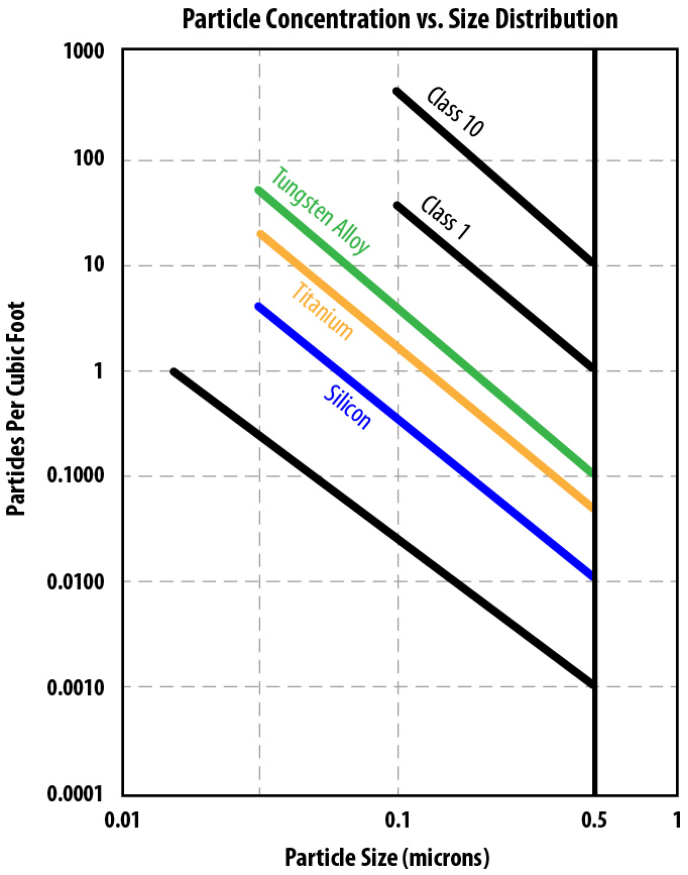
Simco-Ion's titanium emitter points are recommended for many clean-rooms. Titanium emitters meet ISO Class 3 (Fed Std 209E Class 1) requirements for particle emissions, erode less quickly than tungsten, produce no particle bursts and are easily maintained.

Electrode Type	Emitter point	
Class Compatibility	ISO Class 3 (Fed Std 209E Class 1) or better	
Particles – Average/Cu. Ft.	21	
Estimated Life	10-15 years (depending on maintenance and environmental conditions)	
Maintenance Interval	Recommended 3 months	
Products	**22-0350** (.86"/2.18 cm)	Current: Models 5225, 5225S, 5515, 5685, 5802i, 5810i Support: Model 5184, 5285, 5585, 5509e, 5510, 5511
	22-0356 (.58"/1.47 cm)	Current: Model 5802i, 5810i
	22-20358 (.4"/1.02 cm)	Current: Model 5822i
	33-25822iC (.4"/1.02 cm)	Current: Model 5822i replacement emitter kit

Tungsten Alloy

The most common material in industrial ionization applications, tungsten alloy, offers long emitter point life and low maintenance requirements. Simco-Ion's tungsten alloy emitter points will not erode as quickly as conventional tungsten wire, and fewer particle bursts result in cleaner operation.

Electrode Type	Emitter point	
Class Compatibility	ISO Class 4 (Fed Std 209e Class 10) or higher recommended	
Particles – Average/Cu. Ft.	21	
Estimated Life	10-15 years (depending on maintenance and environmental conditions)	
Maintenance Interval	Recommended 3 months	
Products	**22-20398** (.4"/1.02 cm)	Current: Model 5822i
	33-1890 (.86"/2.18 cm wire)	Current: Model 5685 Support: Model 5509e, 5510, 5511, 5285, 5585, 5685-QuadBar
	33-1920 (.315"/.8 cm wire)	Current: Model 4612
	33-1921 (.315"/.8 cm wire)	Current: Model 4612
	33-25822i (.4"/1.02 cm)	Current: Model 5822i replacement emitter kit
	5051248 - 5051251	Current: ScorpION replacement emitter kit
	5051260 - 5051263	Current: IONforce replacement emitter kit
	5051288	Current: fusION replacement emitter kit
	91-6115T-EMT (.66"/1.68 cm)	Current: AirFoce Blow-off Gun



Additional Considerations

The semiconductor industry is extremely concerned about any level of metallic particles. Single crystal silicon emitter points match the requirements for low particles and for being non-metallic. On the other hand, disk drive production and many other critical applications requiring low particle levels use either silicon or titanium emitter points. In many cleanroom applications, the critical particle size is decreasing. It is not good practice to allow large numbers of very small particles from emitter points, as these may be larger than the critical size with the next change in the product technology. In general, cleanroom compatibility requires consideration of many different ionizer characteristics besides the choice of emitter point materials.

In electronics assembly, medical applications, and most areas outside high-quality cleanrooms, any of these emitter point materials may be used, but wire points should be avoided when precise ionizer balance is required.

For more information regarding emitter point materials and cleanroom compatible ionizers, please contact your regional Simco-Ion Sales or representative or email us at salesservices@simco-ion.com

SIMCO ION™
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Technology Group
1141 Harbor Bay Pkwy, Ste 201
Alameda, CA 94502
Tel: 800.367.2452 (in USA)
Tel: 510.217. 0460
ioninfo@simco-ion.com
www.simco-ion.com

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