Ion implantation: Ideal extraction assembly for VIISta HCP, HCS, Trident, and NexGen.

Plansee develops improved replacement parts from refractory metals, graphite, and ceramic for ion implanters from all major manufacturers. The latest development: an assembly for VIISta HCP, HCS, Trident, and NexGen configured systems.

Residual gas in the original extraction assembly from Varian reduces breakdown voltage across electrodes and results in high glitch rates for VIISta HCP, HCS, Trident, and NexGen configured systems. In turn, high glitching can destabilize ion beams potentially decreasing throughput and yield. Such instabilities also accelerate electrode wear resulting in more frequent maintenance and component replacement.

Costs resulting from the need to replace extraction assemblies and parts, including the
associated downtimes, are considerable and prompted Plansee to produce a completely reworked extraction assembly.

Plansee’s Ideal Extraction has been shown to reduce glitching by more than an order of magnitude and, with routine cleaning, service life has averaged 3-4 times longer than that of the original assembly.

At the heart of the new design lies gas-permeable tungsten foil. The foil facilitates pumping between and behind the electrodes and thereby reduces residual gas pressure in the extraction assembly. Consequently, the reduction in pressure increases breakdown voltage and yields a dramatically lower glitch rate.

However glitching is not the only issue: Time-consuming replacement of the original extraction assembly is both costly - in terms of downtime - and difficult. The original extraction assembly weighs approximately 8.2 kg and often takes the combined effort of two people to safely remove it from the tool. Plansee engineers have therefore replaced steel, molybdenum, tungsten, and aluminum mounting components with high-quality graphite, transforming the assembly into a 3-kg lightweight champion with increased thermal stability. As an added bonus, potentially damaging contamination by iron is a thing of the past.

To speed assembly and reduce the cost of replacement parts, electrodes in the Ideal Extraction have been designed to self-align, to allow installation in either slot position, and to be rotatable to offset potentially uneven wear.

With this solution, the Plansee team has managed to substantially improve assembly and increase service life of the electrodes. No alignment tools required!

Mike Reilly is responsible for product development of components for the semiconductor industry at Plansee and sums up the advantages of Plansee's Ideal Extraction: "Our advanced standard Ideal Extraction improves pumping in the electrode gaps and thereby limits discharges, reduces coating, and improves service life. Our engineers took a fresh look at the entire assembly and were able to reduce complexity while improving assembly and alignment - hallmarks of good design. The final embodiments share components and concepts across the entire VIISta high current platform simplifying maintenance and supply chain challenges."

The Ideal Extraction is available from Plansee as a complete, bolt-on, solution for VIISta HCP, VIISta HCS, Trident, and NexGen configured systems.
Find out more about our components for ion implanters and get to know your contact person at Plansee.