

Identification and evaluation of contamination sources during clean room preparation of SRF cavities

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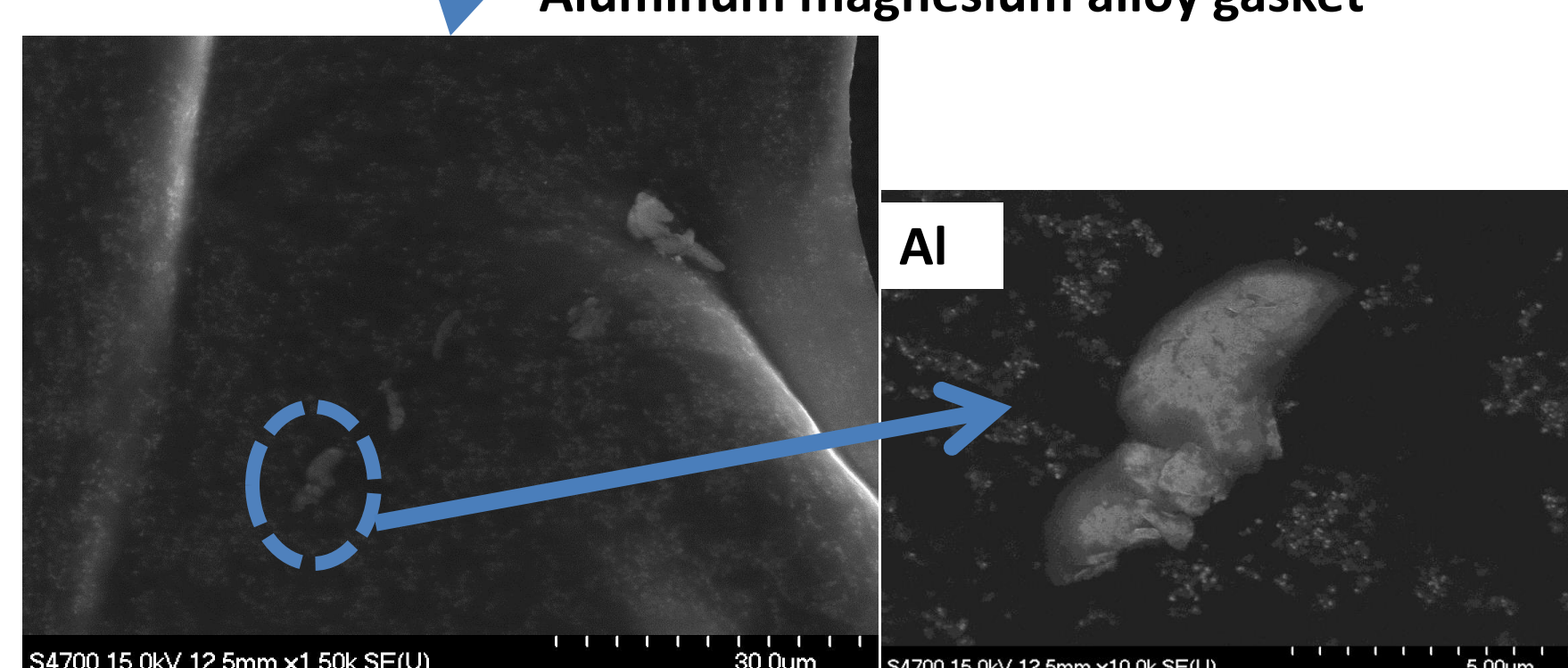
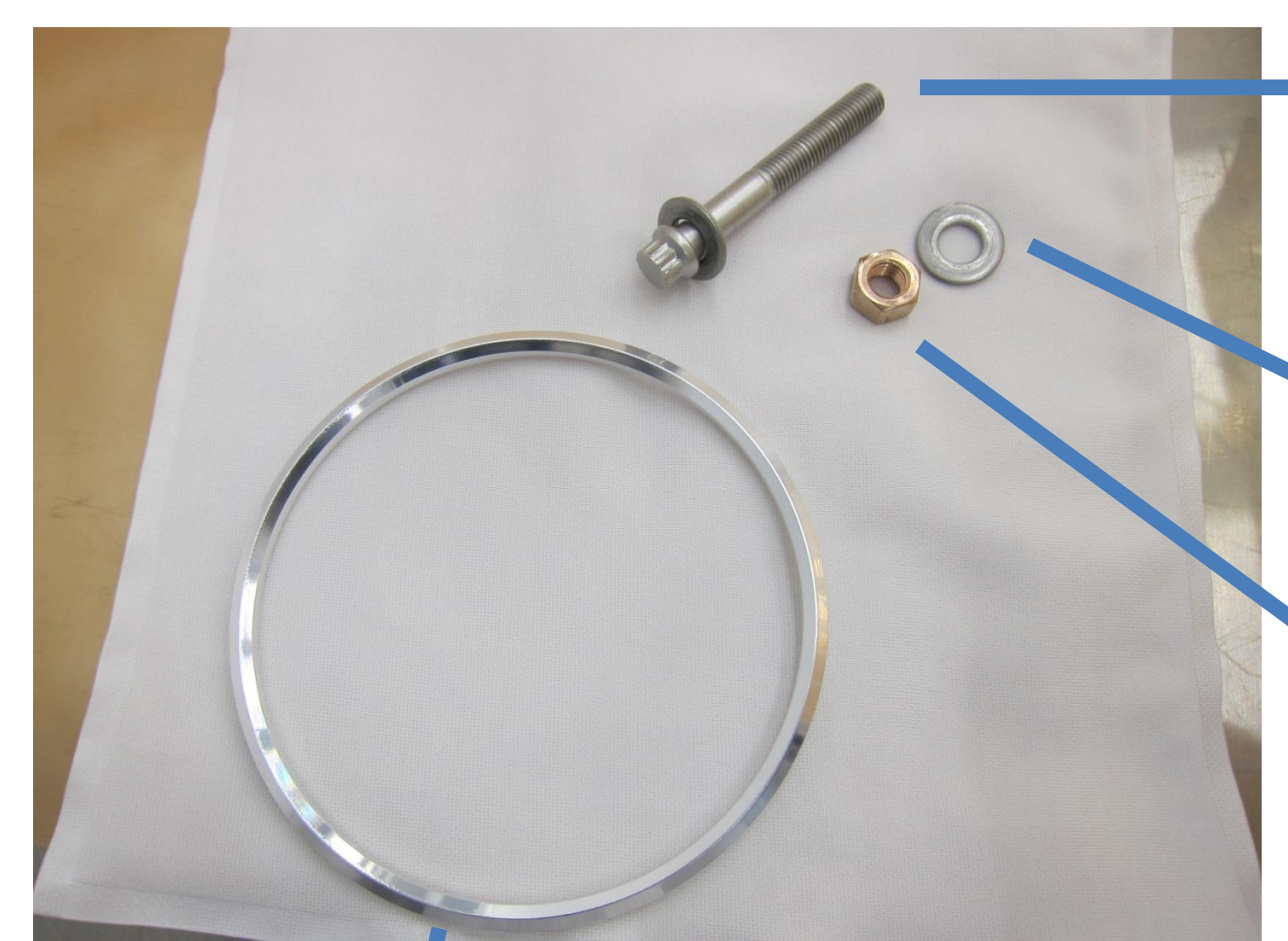
2395 MOPB117

Abstract

Particles are one possible cause of field emission issues in SRF cavity operations. During clean room cavity preparation, several processes could contribute to the generation of particles. One of them is friction between hardware during assembly. It is important to understand the behaviors that generate and propagate particles into cavities. Using a single cell cavity, particle shedding between flanges and other materials have been tested. The number of particles is recorded with an airborne particle counter, and the generated particles are examined with microscopes. The migration of particles into a cavity due to different movements is studied. Suggestions are made to reduce particle generation and prevent contamination of the cavity interior area.

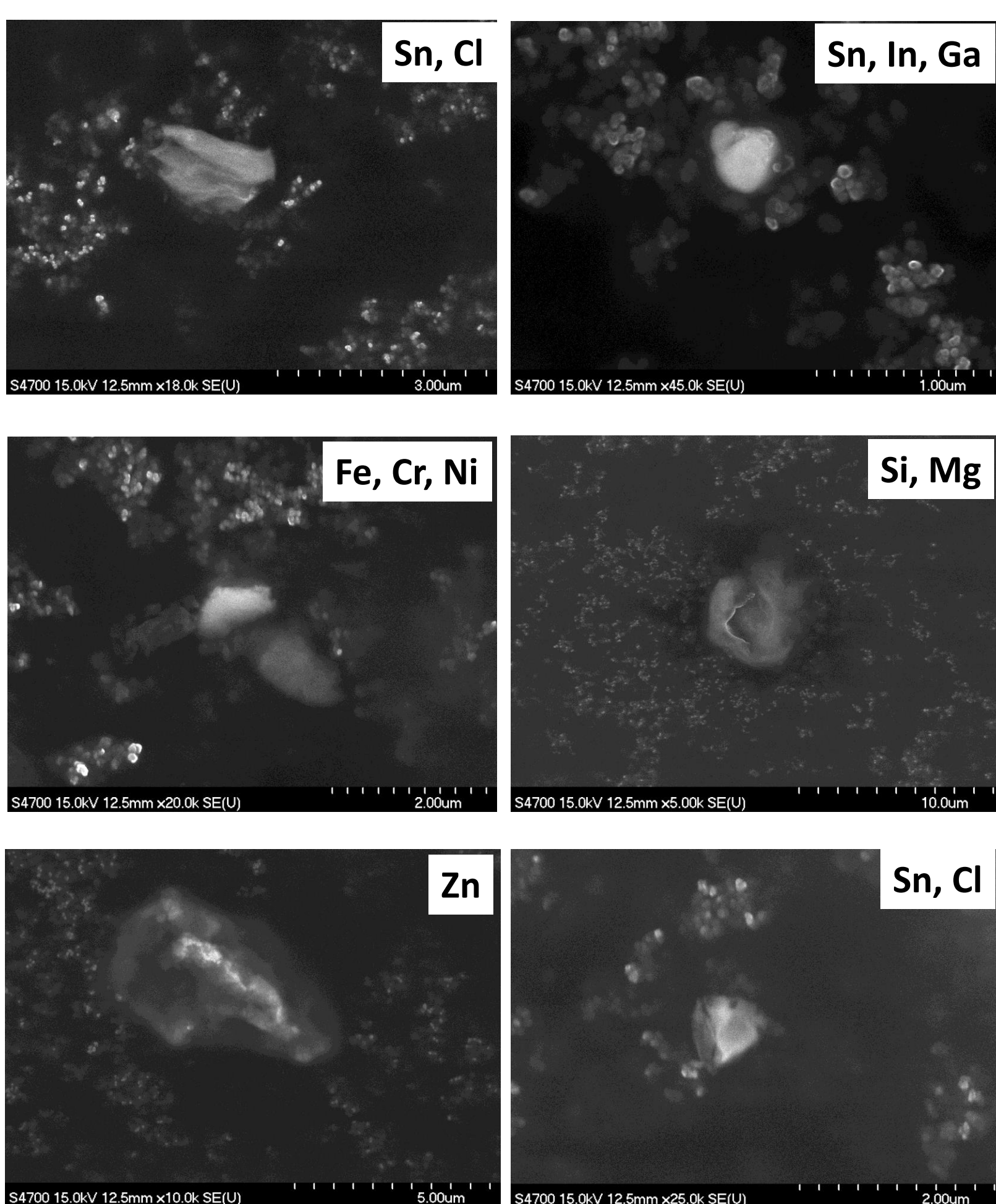
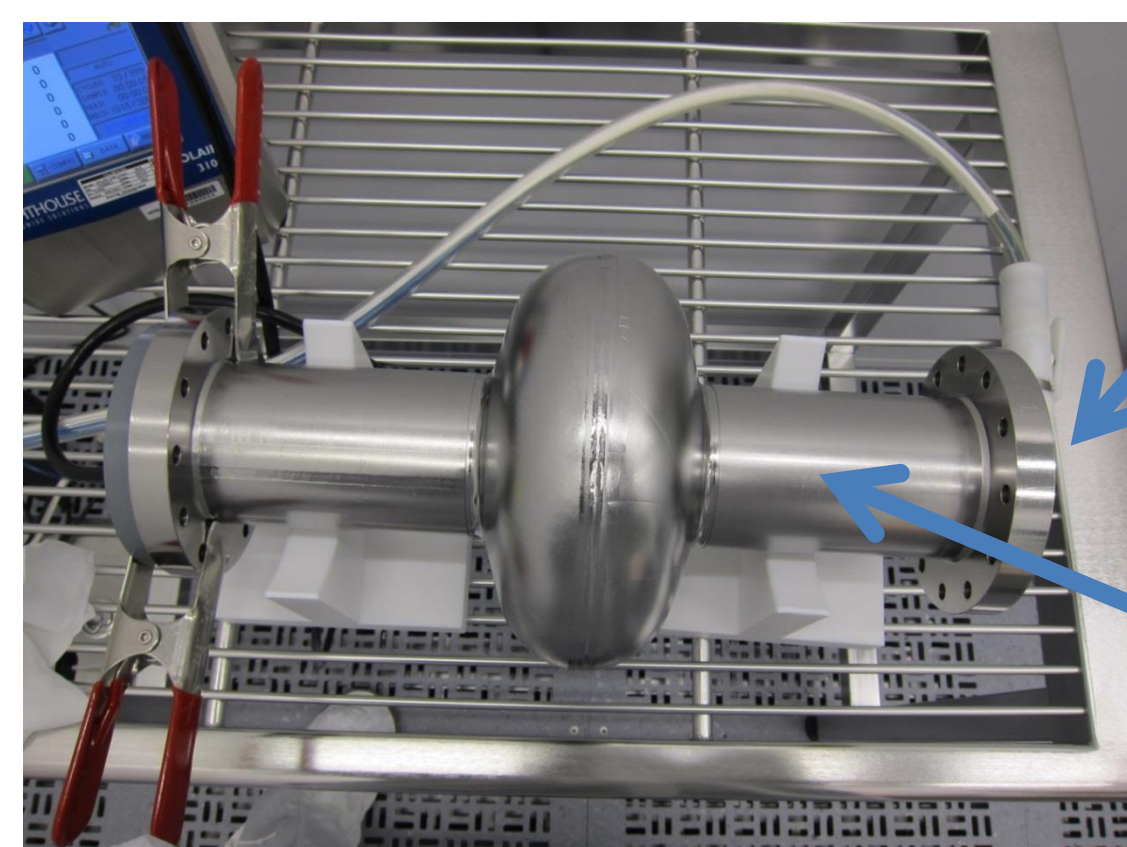
Assembly hardware

- Hardware was cleaned with detergent in ultrasonic tank, thoroughly rinsed with ultrapure water, air-dried, bagged, and transferred to cleanroom.
- Hardware surfaces were sampled for particles right out of bags.
- Particle compositions were identified by SEM/EDS.

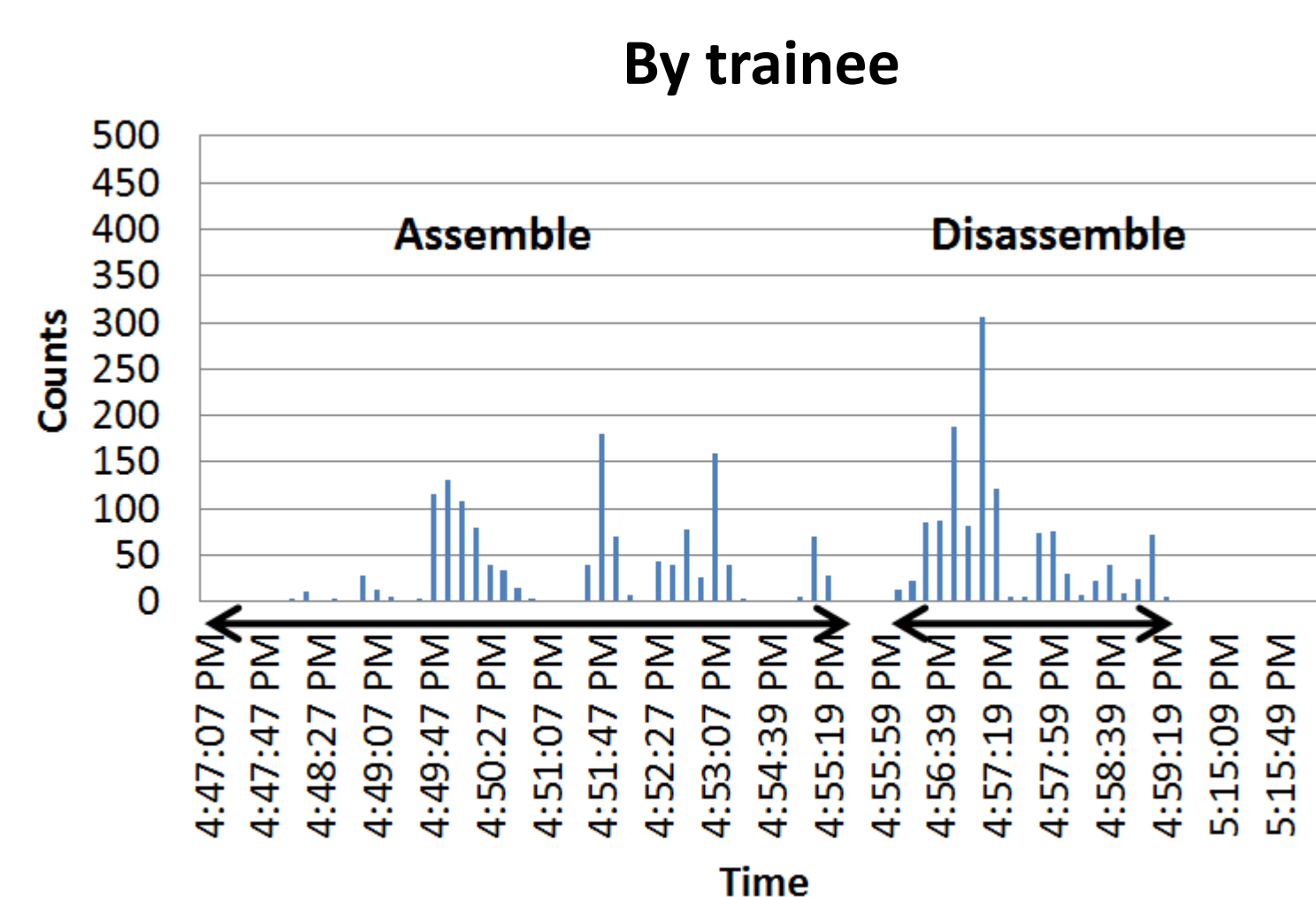


Horizontal assembly - disassembly

1.3 GHz, Tesla shape, large grain niobium, single cell cavity, ultrasonic cleaned, high pressure rinsed, air dried in cleanroom.

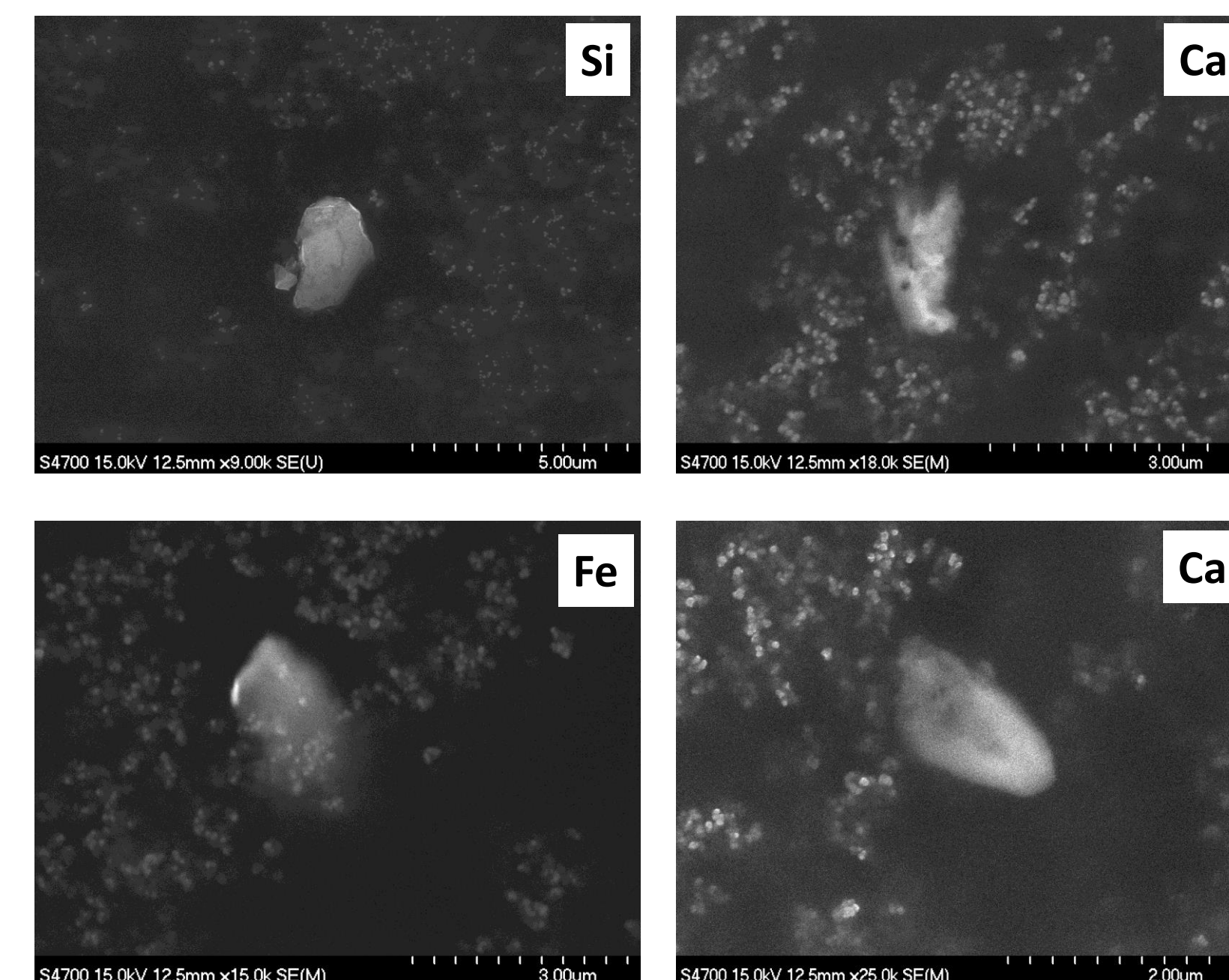
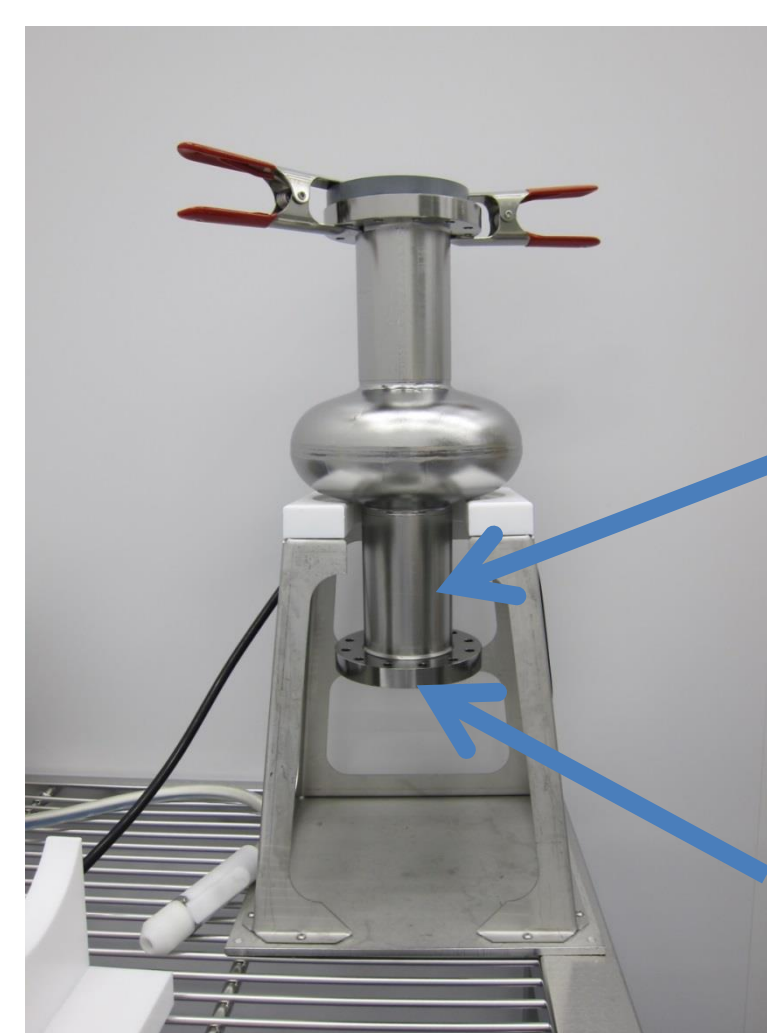


0.3 μ m particle counts during horizontal assembly-disassembly



- SEM images of particles found near particle counter entrance during horizontal assembly-disassembly. Particle counter entrance was located inside the middle of beam pipe.
- Some particles showed composition that matched the assembly hardware, while others did not. The particles with foreign composition may be carried from other surfaces in the assembly area.

Vertical assembly - disassembly



0.3 μ m particle counts during vertical assembly-disassembly

