

Preventing Corrosion and Contamination in Samsung Scrubbers Systems with Siltride



A SILCOTEK® CASE STUDY WITH:

SAMSUNG

"The joint evaluation with SilcoTek is a good example of a productive collaboration. SilcoTek a-SiON (Siltride) coating performed better than 300% for uncoated, control parts, as our results show in the paper. This improvement significantly reduces the environmental footprint of semiconductor manufacturing."

-Cesar Garza, Staff Engineer at Samsung Austin Semiconductor

SUMMARY:

SilcoTek has been widely adopted in the semiconductor manufacturing industry for their corrosion resistant and high-temperature CVD coating technology's ability to increase production and save replacement costs. When Samsung reached out concerning corrosion in their gas abatement systems (exhaust scrubbers), SilcoTek jumped at the opportunity to help them create a game-changing system.

CHALLENGES:

Samsung has determined that the high cost of corrosion of the components in their scrubbers, particularly quenching sleeves and gas distribution rings in the combustion column, is becoming a limiting factor in their production efficiency. Instead of continuing to stop production in order to constantly replace these parts, Samsung came to SilcoTek hoping they could slow the corrosion, increase efficiency, and maintain the integrity of the wafers being processed.

HOW SILCOTEK HELPED:

The semiconductor manufacturing experts at SilcoTek knew that the new Siltride coating technology could be a game-changing solution for Samsung's corrosion problem. The silicon nitride composition creates an excellent barrier against the highly corrosive environment of a scrubber system. Samsung and SilcoTek partnered together to test and evaluate the performance against Samsung's control quenching sleeves and distributors, and after only a few months determined the success of the Siltride coating technology.

GAME-CHANGING BENEFITS:

A high-temperature application in a corrosive environment creates a perfect recipe for destroying machines, leading to inefficient production and compromising quality. The results below show just how game-changing the Siltride coating technology was for these scrubbers.

The images in Figure 1 (below) were taken after the parts had been in use for 42 days. Corrosion and degradation is evident all over the uncoated quenching sleeve, whereas the coated component shows only some minor stains. Additionally, the Siltride-coated parts measures with no mass loss and the control (uncoated) lost 10% of its mass after 42 days in operation.

Figure 2 (below) references continued on-site monitoring of the quenching sleeves after 70 days of operation. Siltride maintains its stellar results and shows no mass loss while the uncoated control part has lost 18% of its initial mass. This performance allows Samsung to operate at the highest level without worrying about contamination or stopping production to replace corroded parts.

SilcoTek's Siltride coating process is the best way to keep your facility running at maximum efficiency, preventing down time, and ultimately saving manufactures from continuing to purchase costly replacements. For a detailed comparison of the Siltride vs uncoated control quenching sleeve, see page 3 of this case study.

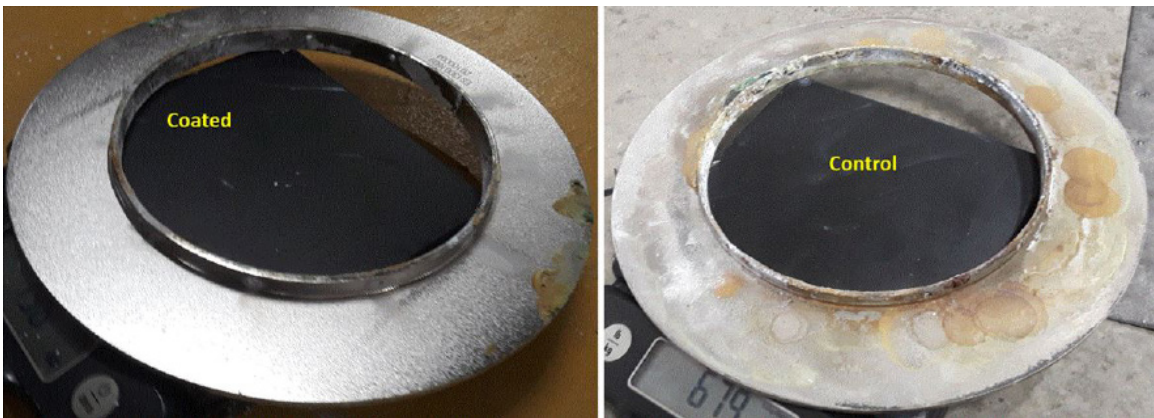


Figure 1: After 42 days in operation, the Siltride-coated (left) shows minor surface stains. The control sleeve shows major corrosion throughout.

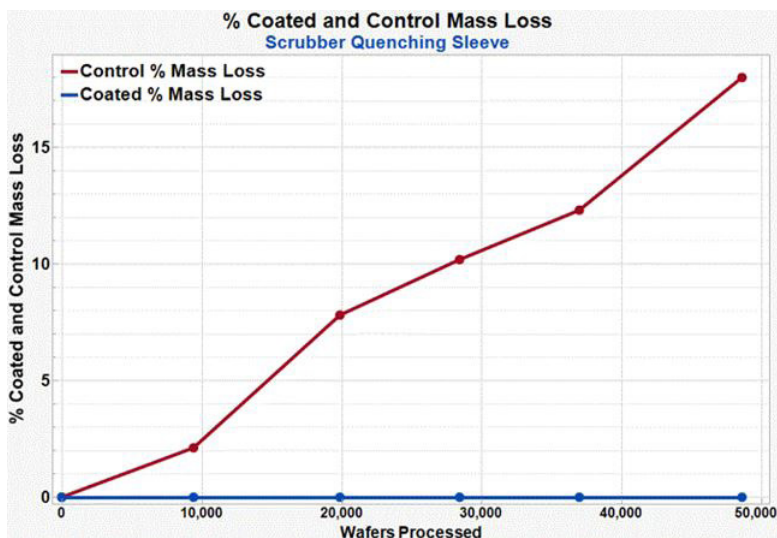


Figure 2: After 70 days in operation, a Siltride-coated quenching sleeve shows no mass loss while the control sleeve has lost 18% of its mass.



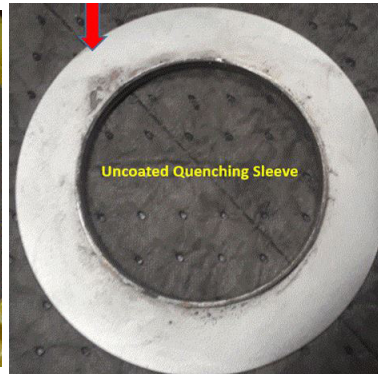
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Siltride vs Uncoated control quenching sleeve:



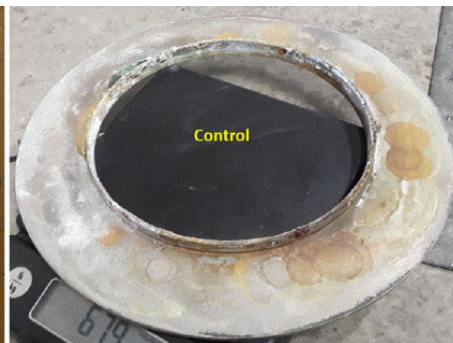
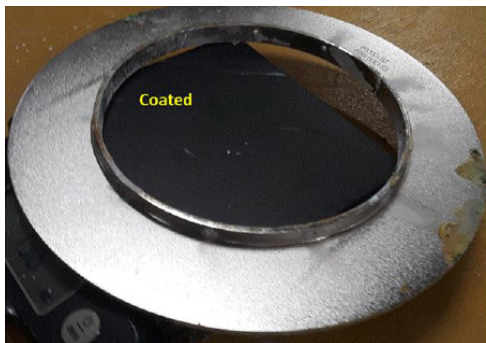
14 DAYS

Just 14 days after installation, there are small areas of corrosion visible in the uncoated sleeve and a measured 2.1% loss in mass. The Siltride-coated sleeve shows no sign of corrosion and no mass loss.



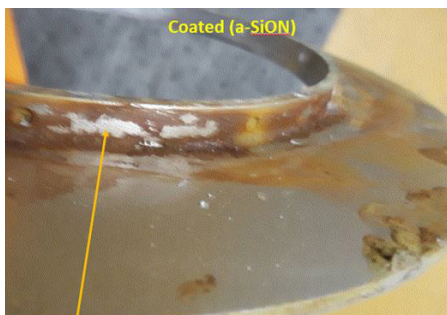
28 DAYS

28 days after installation, the coated quenching sleeve shows no mass loss or evidence of corrosion. The uncoated control shows obvious corrosion and measured a 7.9% mass loss.



42 DAYS

After 42 days in operation, the Siltride-coated (left) shows minor surface stains with no mass loss and the control sleeve shows major corrosion throughout as well as a 10% loss in mass.



70 DAYS

At 70 days, Siltride shows no mass loss and some surface stains that are easily wiped away with a glove. The uncoated sleeve has lost 18% of mass and is close to complete failure due to rampant corrosion and cracks on the interior weld.