

UCT Weldment + ALD Coating Solution

Engineered Together. Performing as One.
Extend Life • Improve Yield • Reduce Cost

MAXIMIZED PERFORMANCE STARTS WITH THE RIGHT FOUNDATION

In semiconductor fabrication, weldments installed in process environments face extreme plasma and highly corrosive process gas exposure. While advanced coatings are critical, coating alone cannot compensate for poor weldment quality.

Defective welds = weak foundation → coating failure → contamination → yield loss

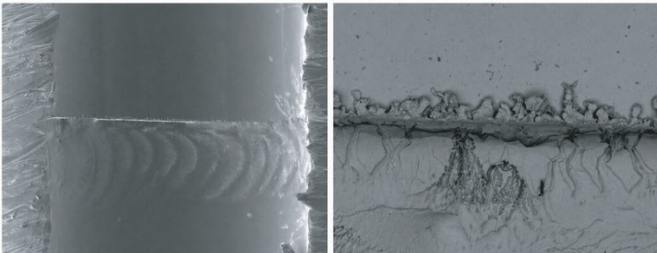
At UCT, we deliver a fully integrated solution where weldment quality and ALD coating performance are engineered together for maximum reliability.

THE PROBLEM: COATING ALONE IS NOT ENOUGH

Even the best coating will fail if applied to a poorly manufactured weldment.

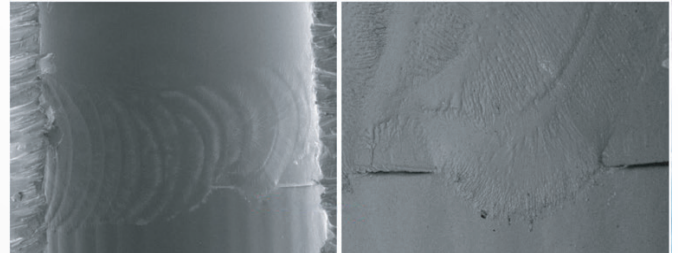
Common Failure Drivers

- Inconsistent weld penetration or porosity
- Surface irregularities and contamination at weld seams
- Poor finishing and preparation prior to coating
- Non-uniform geometries, leading to coating defects



Resulting Impact

- Coating delamination or premature breakdown
- Particle generation from weak weld zones
- Increased defectivity inside process chambers
- Reduced tool uptime and yield



Frequent and/or unplanned weldment replacement not only drives up expenses but also reduces tool availability and overall productivity

UCT SOLUTION: WELDMENT + COATING AS A SYSTEM

1. High-Integrity Weldments (Foundation)

UCT ensures weldments are built specifically for coating success:

- Controlled weld procedures to eliminate porosity
- Optimized surface finishing at weld seams
- Geometry design compatible with conformal coating
- Strict cleanliness and preparation standards

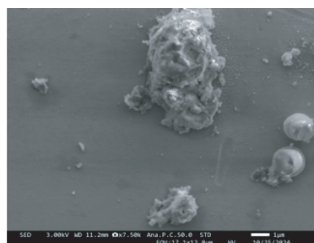
2. ALD Aluminum Oxide Coating (Protection)

Applied on a properly engineered substrate, ALD delivers:

- Ultra-conformal, pinhole-free coverage
- Superior corrosion resistance vs. silicon-based coatings
- Stability in aggressive plasma and halide environments

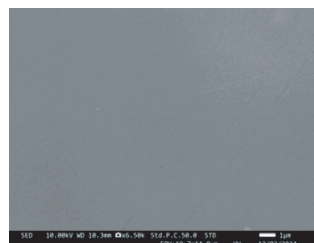
Silicon coating:

Significant amount of degradation and ball-shaped, SiO₂ particles found.



Aluminum oxide coating:

No change to surface morphology or any degradation observed on Al₂O₃ coating.



WHY INTEGRATION MATTERS

Weldment Quality Directly Impacts Coating Performance

WELDMENT CONDITION	COATING OUTCOME
Poor weld quality	Coating defects, early failure
Surface irregularities	Disruption of gas flow; premature wear
Contamination	Reduced adhesion
UCT-controlled weldments	Full ALD performance realized



Key Insight: You don't have a coating problem — you have a system problem. UCT solves both.

PERFORMANCE ADVANTAGES OF THE INTEGRATED SOLUTION

- 2–3x longer service life compared to uncoated or improperly coated weldments
- Significantly reduced particle generation and contamination
- Improved coating adhesion and durability
- Consistent protection across complex weld geometries

PROVEN COATING PERFORMANCE—WHEN APPLIED CORRECTLY

ALD Aluminum Oxide Coating

- No surface degradation observed
- Stable, uniform coverage across weld seams

Conventional Silicon Coating

- Degradation and particle formation
- Failure accelerated at weld defect location

Conclusion: Coating performance is only as strong as the weld beneath it.

KEY BENEFITS FOR SEMICONDUCTOR FABs

Increase Yield

Cleaner weldment surfaces + stable coatings = fewer defects

Extend Maintenance Intervals

Durable system reduces frequency of replacement

Lower Total Cost of Ownership

Fewer failures, less downtime, longer part life

Improve Process Reliability

Consistent weldment + coating = predictable performance

UCT is not just a coatings provider—we are a **complete weldment-to-coating solution partner**:

- **Expertise fabricating weldments** for Etch and ALD process tools, engineered to handle Cl- and F-based corrosive gases and corrosive ALD precursors
- **Integrated process control** from build → prep → coating
- **Global support** with consistent quality standards
- **Proven results** in demanding semiconductor environments

PARTNER WITH UCT

Stop treating weldments and coatings as separate problems.

Choose a unified solution where both are engineered to work together.

UCT Weldment + ALD Coating = Maximum Performance, Reliability, and Yield.

