

ALD EXPERTISE:

Gas & liquid delivery, component cleaning, chemical analysis

The introduction of atomic layer deposition (ALD) provided the semiconductor industry the ability to deposit very thin, highly conformal films and is an enabling technology for continued scaling. Achieving this requires formulating novel precursor chemistries with excellent chemisorption and/or physisorption characteristics to initiate the film and deliver the target film composition.

The majority of ALD precursors are liquids or solids. Thermal control across the entire delivery system is critical to providing the vapor pressure for high deposition efficiency and high-quality films. The process conditions required to provide such benefits on the wafer create challenges in managing the tool cost-of-ownership (COO) especially chamber uptime related to part recycling and reuse. ALD chamber parts are often very complex, brittle and large making it difficult to remove the deposited film and restore to an “as new” condition.

The primary contamination risk for ALD processes are in-film trace metals and surface particles. Verifying the surface impurities in hardware components as well as precursor purity are critical baseline data to ensure film quality.

UCT understands the challenges across the ALD process. With hundreds of engineers and scientists, our expertise spans gas and liquid delivery, component cleaning and chemical analysis providing an unsurpassed expertise to supporting ALD tool fabrication and process performance support.

Today, UCT is one of the largest producers of ALD gas delivery systems providing state-of-the-art design and global manufacturing. We produce complex delivery lines used for ALD. And, our thermal solutions expertise enables us to provide the tightest thermal tolerance for your gas delivery solution: from the ampoule along the delivery gas lines to the chamber exhaust. Our integrated heater solutions eliminate cold spots at weldment bends and connection points preventing condensation and particle risks. Our test equipment engineering team's world class test equipment ensures that every gas delivery system that leaves a UCT facility exceeds our customers performance requirements.

In-film trace metals are a key contamination risk to the ALD film. Precursors and gas lines are potential sources of impurities. Critical purity and cleanliness verification points span from initial production at the chemical or equipment supplier to film composition analysis within the fab. UCT ChemTrace analysis techniques identify in-film trace metals as well as impurities in the precursors. In addition, techniques are customized to enable gas line cleanliness verification and monitoring.



Surface cleanliness that matches new part performance

UCT Services Division cleans and refurbishes ALD equipment parts to meet customer objectives. We developed novel formulations and deposition removal technics that offer high selectivity to the base materials and longer part lifetime. Our automated systems safely handle the large, brittle parts. If incoming parts require repair, our Products Division can replace fittings, valves and other parts of the ALD system. Our experience with a broad variety of ALD deposition chemistries and process hardware ensures your recycled parts will match the performance of new parts while delivering the COO you are targeting.

UCT ChemTrace validates that the cleaned parts are low in trace metals, particles and other impurities. Our analytical chemists work with UCT Services Division process engineers to identify and verify improvements to enhance our customers yields and reduce COO.

UCT is proud to supports the full ALD manufacturing cycle: from the tool manufacturing to the part recycling and across multiple cleanliness and purity analysis points. Our team understands the breadth of the semiconductor industry requirements.

