MINILOCK ALD

Atomic Layer Deposition with a Vacuum Loadlock

Atomic Layer Deposition (ALD), is a new cutting edge technology for the Semiconductor Industry. It provides super high-density films that are extremely uniform with exceptional step coverage. The Minilock ALD system has the capability to grow Atomic Layer Deposition films in Thermal and Plasma Enhanced modes (PEALD). It has the industry's smallest footprint and lowest cost of ownership. The system is available for wafers up to 300mm in diameter.

ALD is a thin-film deposition technique based on the sequential use of a gas-phase chemical process and/or plasma processes (PEALD). The majority of ALD reactions use two chemicals called precursors and reactants. The precursor adsorbs onto the surface of the material and the reactant is added thereafter, one at a time in a sequential, self-limiting, manner.

FEATURES

Reactor

The primary drawback of ALD is its slow overall deposition rate. The reaction is limited by how fast you can pump out the reactor and switch to the next sequential step. Therefore, Pump Speed and Reactor volume are all important to rate.

The Minilock ALD Reactor has a small volume and a very high pump speed. Also, it is made of highly polished Aluminum that has been passivated not to absorb water. The cathode and anode are each machined out of single blocks of aluminum reducing the possibility of vacuum leaks. Heater sticks are embedded into the chamber, which can be controlled from 30-120°C to increase process reproducibility, and reduce sidewall deposition.

The bottom Electrode is capable of controlling temperature up to 650°C.

Inductively Coupled Plasma (ICP, PEALD)

The Minilock ALD system comes equipped with an Inductive Plasma source that greatly increases the reactivity of the reaction and thereby decreases process time, stress and the overall operating temperature. The Inductively Coupled Plasma source has been designed to allow rapid plasma strikes at very low powers.

The base system includes a Low Frequency generator for chuck bias. Biasing the chuck can also produce changes in the property of the films.

Vacuum Load-Lock

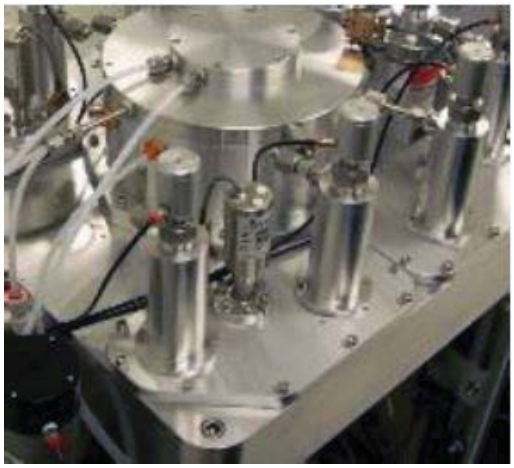
The vacuum loadlock is a separate vacuum chamber to load the samples using a robotic arm. It has a slit valve to the reaction chamber that allows the reactor chamber to stay under vacuum at all times. The robotic arm has a direct drive pick-and-place mechanism that provides high reliability, and accurate loading.

Gas Delivery

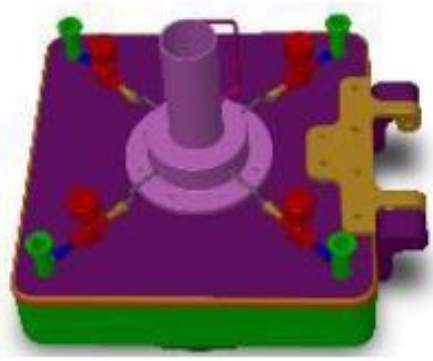
The reactor comes with four proprietary in-situ gas vaporization chambers (for the liquid precursors). It also has four additional gases (standard) for close-coupled gas delivery. In this manner, high rate switching can be achieved. The four delivery tanks can be sequentially used for gas delivery while the others are used for in-situ liquid vaporization.

Liquid Precursors

Up to four precursor vessels can be mounted on the chamber lid. Each precursor can be independently temperature controlled from the software. The close location of these precursors to the entry point reduces residence time into the chamber. There are four entry points for precursors into the chamber. In addition, there is a gas entry port in the ICP source, and an optional chamber entry point is available for use with a gas ring connected to the gas delivery box.



Trion Technology can supply prefilled material in a stainless-steel cylinder. For customers looking to research new precursors, we offer a vessel that can be easily filled with an experimental liquid.



Pumping System

A 390l/s turbo pump is mounted in a position that provides high pump speed, close coupling and easy removal with minimal effort. The reactor pressure is controlled by a throttle valve that can be locked into a fixed position for fast gas stabilization.

Touch Screen

The touch screen interface provides the operator with full operator process information at all times. The intuitive software interface guides the operator interface through each sequence in a logical fashion, and gives touch control of all process parameters.

A Program Logic Controller provides simple and reliable system control. The standard Trion Technology interface ensures quick connections to all components, and the additional ports allow for future upgrades.

Safety

Our systems have been designed and manufactured following SEMI S2 guidelines, and are CE compliant. Large, well-marked EPO buttons are placed on the front of the system so the system can be easily put into shutdown mode should any dangerous situation arise.

Facilities

Facility schematics can be provided upon request.

TRION TECHNOLOGY

Founded in 1989 by Randy Crockett, Trion Technology is a privately held company that manufactures leading-edge processing equipment in the USA. We delivered our first system to Sematech in 1990, and have an installed base of over 550 systems. Our customers range from a small university department, to a start-up with limited funding, to large corporations running 24/7 production operations. With such a diverse customer base, and a 25+ year process library, we are uniquely positioned to provide a true “Lab to Fab” philosophy.

Trion Manufacturing, Sales and Service

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