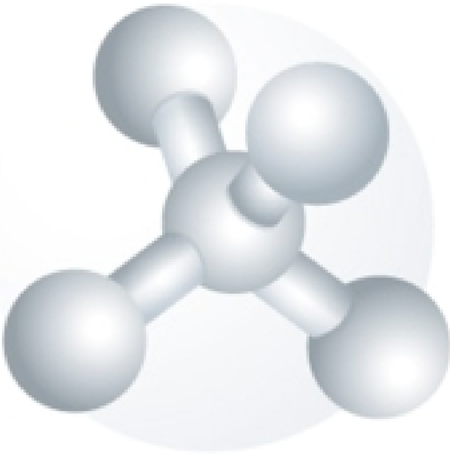
AIR LIQUIDE™
ELECTRONICS

ALOHA™ Special Precursors



ZyALD

Air Liquide High Temperature ZrO_2 ALD for High-k Films

CAS n° Confidential

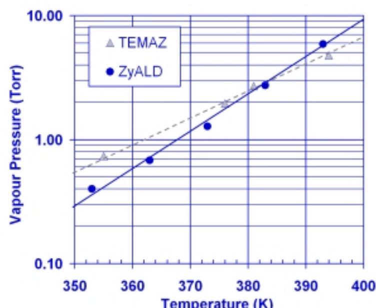
- Depositing high-k films at high temperature (>300°C) has been found to bring multiple benefits, such as higher as-dep k-value due to the predominant tetragonal phase of the oxide, or allowing faster chamber purge-out to avoid material build-up and particle excursions.
- Today's most common Zr ALD precursors such as TEMAZ have been found to yield self-limited ALD growth behaviour up to ~ 275°C only, beyond which point parasitic CVD is obtained.
- ALOHA has thus engineered ZyALD™, a precursor that enables to widen the ALD, self limited growth process window of high-k films.
- Additional key benefits of this compound is its high volatility and evaporation rate, thermal stability and similar growth per cycle to that of TEMAZ. These features combine to bring high process throughput, perfect uniformity and film quality.
- Last but not least, this simple synthesis route and availability of raw material will not impose a significant added cost compared to the existing solutions in high volume.
- This new development exemplifies how we support our customer and OEM partners with capabilities to design, manufacture and evaluate new CVD and ALD chemistries for a large variety of applications and deposition methods.

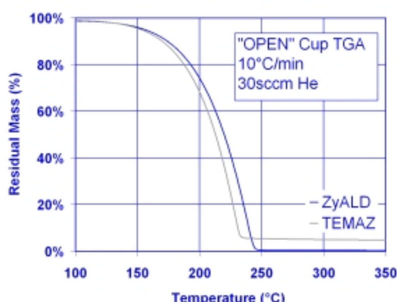
Basic Physical Properties

Physical Properties	ZyALD™
Physical State	Free flowing Liquid
Colour	Pale Yellow
Melting Point	< 0°C
Vapour Pressure	~1 Torr @ 100°C
Liquid Density	1.17 $g.cm^{-3}$
Flash Point	108°C
Viscosity	8.2cP @ 26°C

www.aloha.airliquide.com

ZyALD vs TEMAZ on Vapour Pressure and Thermal Gravimetric Analysis

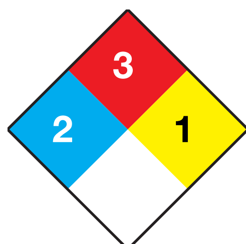




Left : VP of ZyALD vs TEMAZ

Right : TGA of ZyALD vs TEMAZ

Hazard Rating

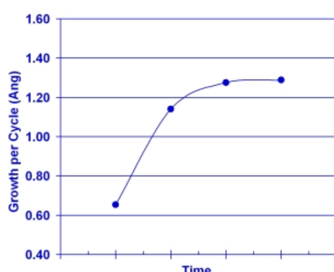


HMIS
Health: 2
Flammability: 3
Reactivity: 1

EU Classification: Xi (Irritant)
EU Risk Phrases: R10; R36/37/38
EU Safety Phrases: S16; S26

- Please consult ALOHA for additional handling data and detailed material compatibility recommendation.

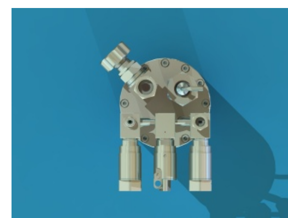
ZyALD ALD Performances



- Thanks to its very high thermal stability, ZyALD exhibits perfect self limited growth by Atomic Layer Deposition, with a saturated growth per cycle up to 1.28 Ang (with ozone as a co-reactant).
- Self limited growth can be obtained up to temperature of 350°C

Packaging & Dispensing System

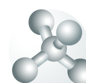
- ZyALD can be packaged in a variety of canisters depending on the application.
- For on-board applications, ZyALD is usually supplied in 1200 or 1800 ml canisters with various valving and dip-tube configurations.
- ALOHA's on-board canisters have all-metal construction and are cleaned and dried by state of the art techniques. ZyALD can also be filled in properly documented customer-supplied canisters.



Transport Information

- Organometallic substance, liquid, water reactive, n.o.s.
- CAS n° Confidential
- UN Number: 3398
- Packing Group: PG II
- DOT LABEL(S) REQUIRED: Class 4.3 (Dangerous When Wet)

Air Liquide ALOHA is providing a complete advanced precursor solution. ALOHA portfolio covers low k, high k, barrier, metal gate, electrode, including some proprietary solutions for SiN, metals and High k. **Certain aspects of Air Liquide technology may be covered by Air Liquide Intellectual Property rights.**



ALOHA
ELECTRONICS PERFORMANCE MATERIALS

For more information please contact: **aloha@airliquide.com** or your local Air Liquide representative.