

ALD Materials

Precursor Materials for Atomic Layer Deposition

Specializing in solid precursors for semiconductor applications.

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As the semiconductor industry becomes increasingly sophisticated, the demand for alternative materials will continue to grow. As a leading supplier of inorganic chemicals with deep expertise in handling, synthesizing and customizing complex materials, Materion specializes in solid precursors for advanced semiconductor applications, including aluminum chloride (AlCl_3) and molybdenum oxychloride (MoO_2Cl_2)*.

From sourcing raw materials to in-house chemical synthesis and analysis to packaging and shipping, Materion's vertical integration allows for the highest level of production control.

We are experts in:

- Customized manufacturing: synthesis, processing, and analysis
- Producing challenging, custom materials
- Particle size, purity, and packaging to meet stringent requirements
- Air- and moisture-sensitive material manufacturing and processing
- Scaling processes from R&D samples to full production quantities

Chemical and Physical Characterization

- X-ray diffraction
- ICP-OES/ICP-MS/AA/GDMS spectroscopies
- O, N, C, S combustion analysis
- BET surface area
- Ion-selective electrode
- Laser diffraction particle size analysis
- TGA/DTA
- Wet chemical analysis

ISO
Certified

9001:2015
14001:2015
17025:2017

*Patent pending for MoO_2Cl_2

Aluminum Chloride (AlCl₃)

Materion supplies ALD precursors into the semiconductor market, including aluminum chloride (AlCl₃) for specialty memory applications. A safer alternative for trimethylaluminum (TMA), AlCl₃ is suitable for <12 nm applications.

Aluminum Chloride vs. Trimethylaluminum

- Nonexplosive, non-pyrophoric alternative
- Easier/safer storage
- Safer alternative for handling and environment
- TMA to AlCl₃ transitioned at multiple 3D NAND/producers
- Carbon is not part of matrix, eliminates residual carbon within layers



Physical Properties

Chemical Name	Aluminum Chloride
CAS-No	7446-70-0
Chemical Formula	AlCl ₃
Purity	99.999%
Appearance	Powder
Color	White
Particle Size	-10 mesh

Current Specification*

Element	Max ppm
Ca	1
K	5
Na	1
P	<7
Si	3
Zn	3

*Ca by ICP-OES. All others ICP-MS

Molybdenum Oxychloride (MoO₂Cl₂)

Materion manufactures ALD precursors for the semiconductor market, including molybdenum oxychloride (MoO₂Cl₂) for 3D NAND Flash with 300-layer architecture applications. A replacement for tungsten(VI) fluoride (WF₆), MoO₂Cl₂ develops a Mo precursor as the leading solution for <10 nm applications.



Molybdenum Oxychloride vs. Tungsten(VI) Fluoride

- Mo resistivity found to be an improvement over W in devices
- No corrosive, device-damaging fluorine residue left behind in process when using MoO₂Cl₂
- MoO₂Cl₂ is suitable for 100+ layer designs

Physical Properties

Chemical Name	Molybdenum Oxychloride
CAS-No	13637-68-8
Chemical Formula	MoO ₂ Cl ₂
Purity	99.995%
Appearance	Powder or pellets

More than a supplier, your R&D partner

- Customized materials and particle size
- Batch-to-batch consistency
- Highly reliable products
- Vertically integrated to allow for the highest level of production control.
- Specialized packaging
- Manufactured to the most stringent material requirements

Markets & Applications

- Advanced Semiconductor
- Advanced Memory
- Data Storage
- 3D NAND Flash
- DRAM