

ALD Materials

Atomic layer deposition (ALD) is a chemically self-limiting deposition technique that is based on the sequential use of a gaseous chemical process. In most cases, ALD reactions use two chemical precursors which react with a surface one at a time in a sequential, self-limiting, manner. A thin film results from repeating the deposition sequence as many times as needed to reach a certain thickness. The major characteristic of the films is their conformality and the fact that the amount of control provided by an ALD arrangement (where the reacting precursors are spatially separated) allows to obtain very thin deposited layers (as fine as $\sim 0.1 \text{ \AA}$ per cycle). Precursor selection is key in ALD processes, namely finding molecules which will have enough reactivity to produce the desired films, but are stable enough to be handled and safely delivered to the reaction chamber.

Key Element	Precursor	Chemical Name	Gelest Product Code
Al	$(\text{CH}_3)_2\text{Al O}^i\text{Pr}$	Dimethyl Aluminum Isopropoxide	OMAL025
Co	$\text{Co}(\text{thd})_3$	Cobalt tris(tetramethylhepta-3,5-dionate)	AKC240
Co	$\text{CoCp}(\text{CO})_2$	Cobalt Cyclopentadienyldicarbonyl	OMCO018
Co	$\text{Co}_2(\text{CO})_8$	Cobalt Carbonyl	INCO030
Co	$\text{Co}(\text{CO})_3\text{NO}$	Cobalt Tricarbonyl Nitrosyl	INCO032
Cu	$\text{Cu}(\text{acac})_2$	Copper Acetylacetonate	AKC260
Cu	$\text{Cu}(\text{hfac})_2$	Copper II Hexafluoropentanedionate, dihydrate	AKC253
Cu	$\text{Cu}(\text{hfac})\text{VTMS}$	Copper (I)(II) Hexafluoropentanedionate - Vinyltrimethylsilane	AKC252.8
Hf	TEMAH	Tetrakis(ethylmethylamido) Hafnium	OMHF083
Hf	TDMAH	Tetrakis(dimethylamido)Hafnium	OMHF080
Hf	TDEAH	Tetrakis(diethylamino)Hafnium	OMHF075
La	$\text{La}(\text{thd})_3$	Lanthanum tris(tetramethylhepta-3,5-dionate)	AKL435
La	$\text{La}[\text{N}(\text{SiMe}_3)_2]_3$	Tris[bis(trimethylsilyl)amino] Lanthanum	SIL6464.0
Li	$\text{Li}(\text{OtBu})$	Lithium t-butoxide	AKL454
Li	LiHMDS	Lithiohexamethyldisilazane	SIL6467.0
Mn	$\text{Mn}(\text{thd})_3$	Manganese tris(tetramethylhepta-3,5-dionate)	AKM546
Ni	$\text{Ni}(\text{acac})_2$	Nickel(acetylacetonate)	AKN580
P	TOP	Trioctylphosphine	OMPH080
Ru	$\text{Ru}(\text{Cp})_2$	Dicyclopentadienyl Ruthenium	OMRU055
Ru	$\text{Ru}(\text{EtCp})_2$	Ruthenium Bis(ethylcyclopentadiene)	OMRU027
Sb	$\text{Sb}(\text{DMA})_3$	Tris(dimethylamino)antimony	OMAN080
Se	$\text{Bis}(\text{TMS})\text{Se}$	Bis(trimethylsilyl)selenide	SIB1871.0
Si	$\text{Si}(\text{DMA})_3$	Tris(dimethylamino)silane	SIT8714.0
Si	BTBAS	Di(t-butylamino)silane	SID2795.0
Si	HCDS	Hexachlorodisilane	SIH5905.0
Si	SiCl_2H_2	Dichlorosilane	SID3368.0
Si	$(\text{DMA})_4\text{Si}$	Tetrakis(dimethylamino)silane	SID7276.0
Si	$(\text{t-butoxy})_3\text{SiOH}$	Tri(t-butoxy)silanol	SIT8088.0
Si	$(\text{t-pentoxy})_3\text{SiOH}$	Tri(t-pentoxy)silanol	SIT8627.0

Si	BDMADMS	Bis(dimethylamino)dimethylsilane	SIB1072.0
Si	FDTs	Perfluorodecyltrichlorosilane	SIH5841.0
Si	SiI ₄	Tetraiodosilane	SIT7123.0
Si	SiH ₂ I ₂	Diiodosilane	SID3520.0
Si	HMDS	Hexamethyldisilazane	SIH6110.0
Si	OMCTS	Octamethylcyclotetrasiloxane	SIO6700.0
Si	SiCl ₄	Silicon Tetrachloride	SIT7085.0
Si	TMDO	tetramethyldisiloxane	SIT7546.0
Si	TMDS	tetramethyldisilazane	SIT7542.0
Si	Trisilane	trisilane	SIT8709.6
Si	7-Octenyltrichlorosilane	7-Octenyltrichlorosilane	SIO6708.0
Sn	Sn(DMA) ₄	Tetrakis(dimethylamino)Tin	SNT7350
Sn	TMT	Tetramethyltin	SNT7560
Sn	BuSnCl ₃	Butyltrichlorotin	SNB2000
Sn	Sn(DEA) ₄	Tetrakis(diethylamino)Tin	SNT7294
Ta	PDMAT	Pentakis(dimethylamido)tantalum	OMTA075
Ta	Ta(OEt) ₅	Tantalum Ethoxide	AKT810
Ta	TBTDET	(t-butylimido)tris(diethylamido)tantalum	OMTA082
Ta	TaF ₅	Tantalum pentafluoride	INTA075
Ta	t-buN=Ta(NEt ₂) ₃	Tris(Diethylamino)t-butylimino tantalum	OMTA082
Te	Bis(TMS)Te	Bis(trimethylsilyl)tellurium	SIB1873.0
Ti	TiCl ₄	Titanium Tetrachloride	INTI065
Ti	TDMAT	Tetrakis(dimethylamido)titanium	OMTI080
Ti	Ti(OiPr) ₄	Titanium Isopropoxide	AKT872
Ti	TDEAT	tetrakis(diethylamido)titanium	OMTI075
Ti	TEMAT	tetrakis(ethylmethylamido)titanium	OMTI083
Ti	Ti(OMe) ₄	Titanium Methoxide	AKT880
Zn	DEZ	Diethyl Zinc	OMZN017
Zr	TEMAZ	Tetrakis(ethylmethylamido)zirconium	OMZR083
Zr	TDMAZ	Tetrakis(dimethylamido)zirconium	OMZR080
Zr	ZrCl ₄	Zirconium Tetrachloride	INZR0665
Zr	TMPZ	Zirconium Tris(2,2,5,5-tetramethyl-2,5-disilapyrrole)chloride	SIZ9920.0
Zr	Zr(OtAm) ₄	Zirconium 2-methyl-2-butoxide	AKZ965
Zr	Zr(OCH ₂ CH ₂ SiMe ₃) ₄	Zirconium Trimethylsilylethoxide	AKZ990

Gelest, Inc., headquartered in Morrisville, PA, provides technical expertise in silicon and metal-organic materials for applications in Microelectronics & Optoelectronics. The core manufacturing technology of Gelest is silanes, silicones and metal-organics with the capability to handle flammable, corrosive and air sensitive liquid, gases and solids.