Enabling tomorrow's technologies

Unlock cutting-edge microchip architectures

dockchemicals.com

Dock

About us

30 years successful track record in offering precursor solutions for next generation semiconductors.

- Privately held company, Team of 70+ highly specialized professionals
- Focus on process chemistry and innovation
- Configurable pilot process lines up to 50l. Glass, stainless steel or application specific linings of reactors & distills
- World scale manufacturing of group V MO precursors (P, As, Sb)
- Full portfolio of standard MOCVD group III precursors & dopants
- Strong line of products for ALD
- Novel precursor development
- Strong cylinder servicing line, DOCK operate >10,000 cylinders w/w, cleaning & transfilling for third parties

Science driven company

30 years of innovations made in Marburg/Germany

Strong R&D cooperation with University Marburg, one of Germany's leading universities for material science and new precursors (focus: new applications / 4 research groups).

Multiple additional successful cooperations with research institutes and Universities on precursor development/applications.

Own R&D team of 10+ PhDs and research labs

Full range of analytical capabilities

PUM Deposition & demo capabilities

Growth-related equipment

AIXTRON 300mm CRIUS R CCS Cluster

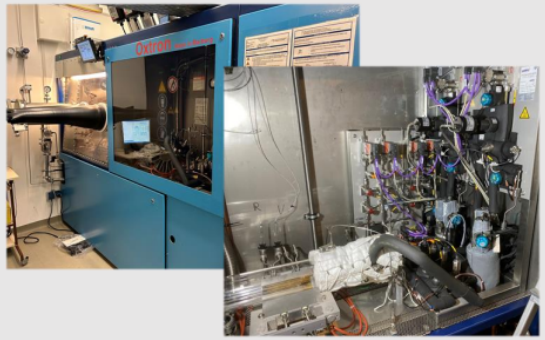
- Two 300mm reactors for separated III/V and IV growth
- Automated wafer handling
- FOSB-Cassette System
- In-situ temperature and bowing measurements

2x AIXTRON 200-GFR

- 2“ reactors for fast and cost-effective growth studies
- Glove box for sample transfer under inert gas
- In-situ: RAS/mass spectroscopy
- All kind of III/V and 2D materials

Home-build ALD tool

- 2“ reactor (like Aix 200)
- III/V ready (leak tight)
- ALD gas supply by Sempa
- Heated gas supply for low vapour pressure sources (e.g. Sc, Y..)



Philipps Universität Marburg

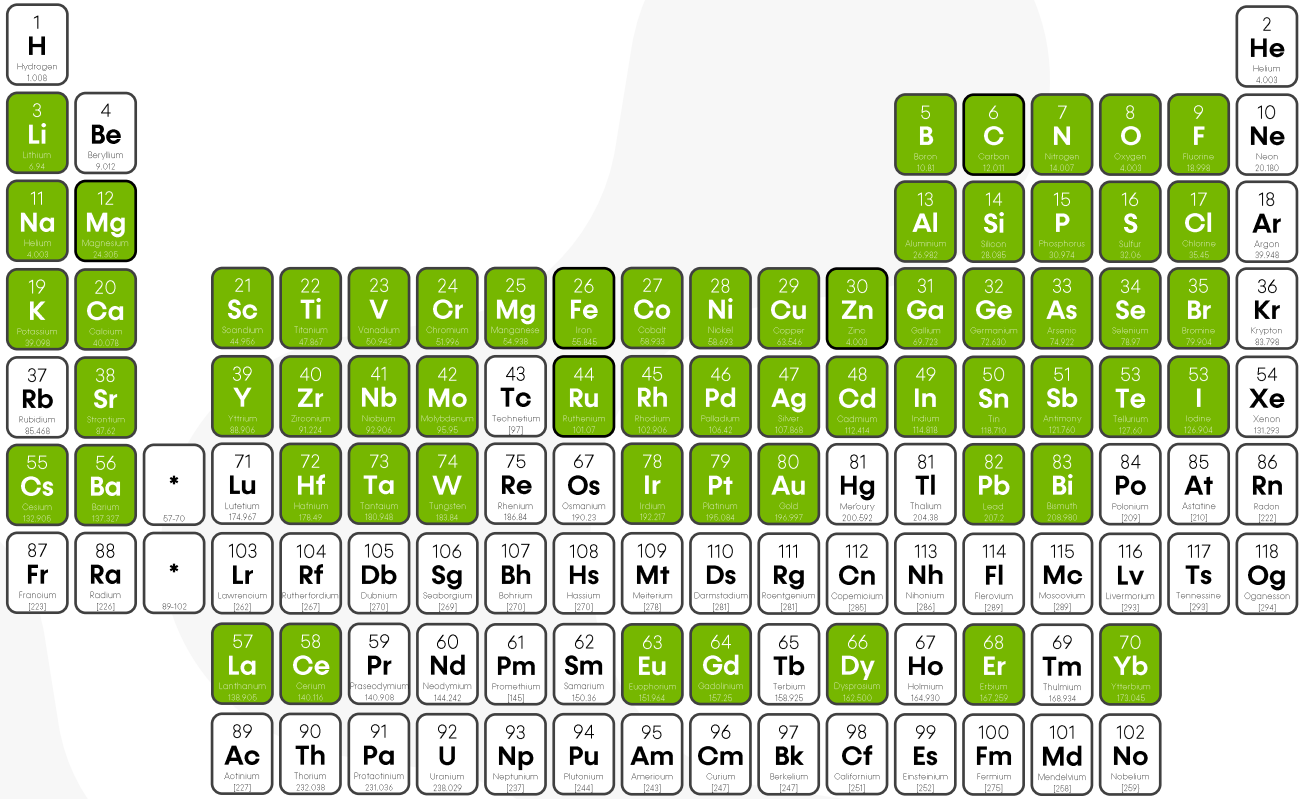
Structure & Technology Research Laboratory

Dock

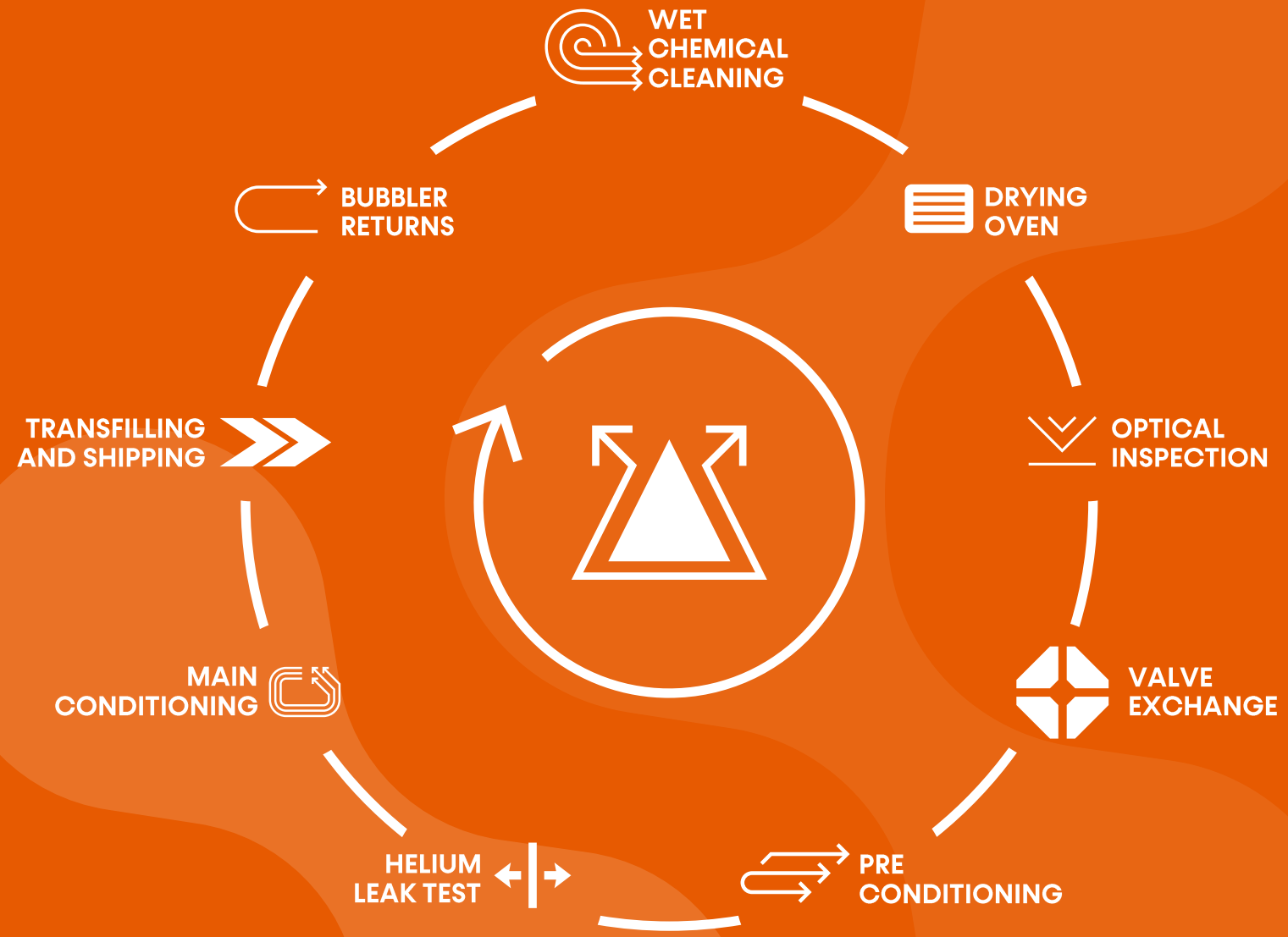
Wide range of precursor materials and dedicated services

- ALD – Driving ALD to the next level
- MOCVD – Full range of group-III, group-V and dopants
- Custom Synthesis – Customized to your needs
- Worldwide Precursor/cylinder Management and Support

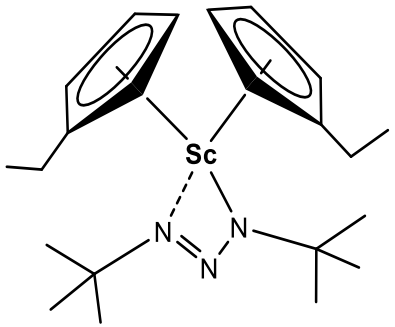
More solutions on:



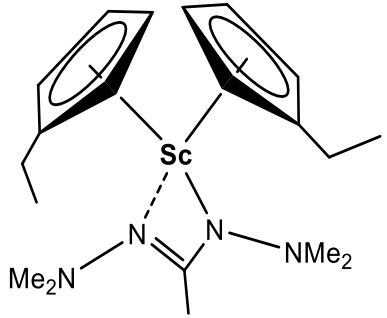
Full service



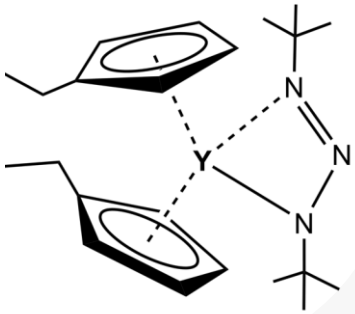
Overview – new Sc and Y precursors



ASGARD
(EtCp)2Sc(dbt)



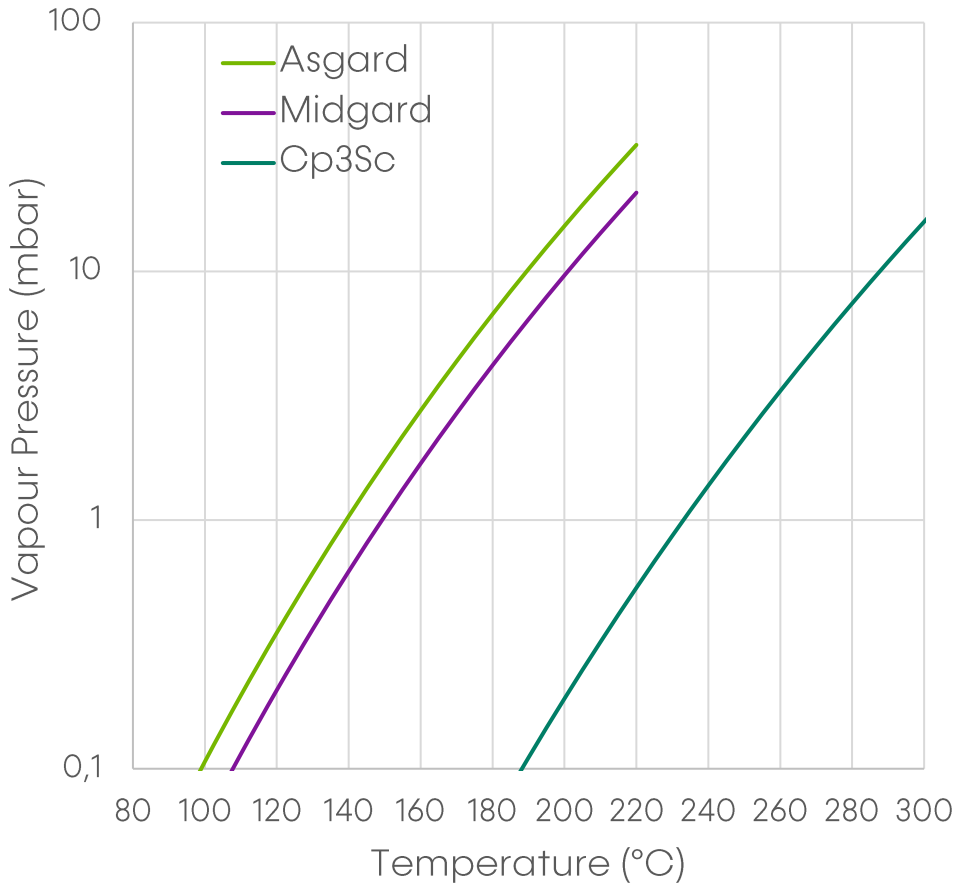
MIDGARD
(EtCp)2Sc(bdma)



OLYMPUS
(EtCp)2Y(dbt)

	ASGARD (EtCp)2Sc(dbt)	MIDGARD (EtCp)2Sc(bdma)	OLYMPUS (EtCp)2Y(dbt)
Density	ca. 1.2 g/cm^3	ca. 1.3 g/cm^3	ca. 1.3 g/cm^3
Molweight	387.51 g/mol	374.46 g/mol	431.45 g/mol
Melting Point	< 25°C	< 25°C	40°C
Vapor Pressure	1mbar @ 140°C log(p(mbar))=9.22-3803/T(K)	1mbar @ 150°C log(p(mbar))=9.03-3804/T(K)	1mbar @ 135°C log(p(mbar))=7.91-3169/T(K)

Vapour pressure (Asgard/Midgard)



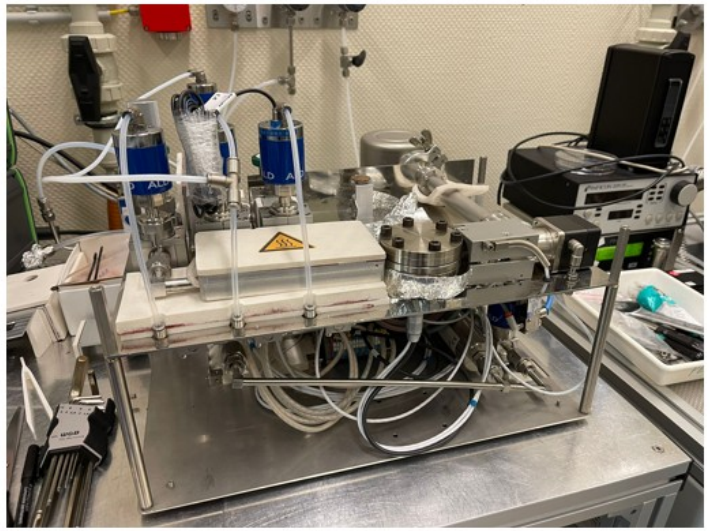
High volatility of Midgard and Asgard:

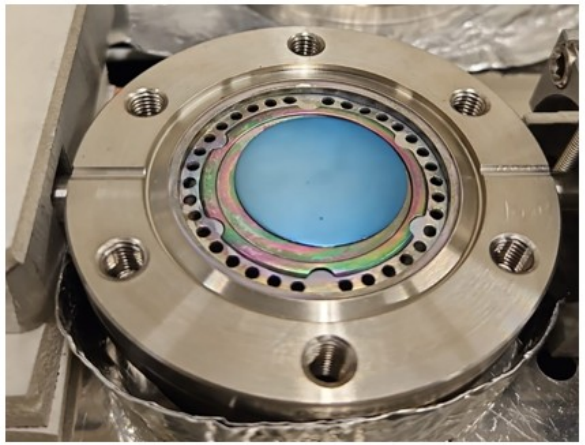
- Lower Bubbler storage temperatures required
- Higher growth rates achievable
- Much lower thermal budget during growth (improved interface quality, less interdiffusion)

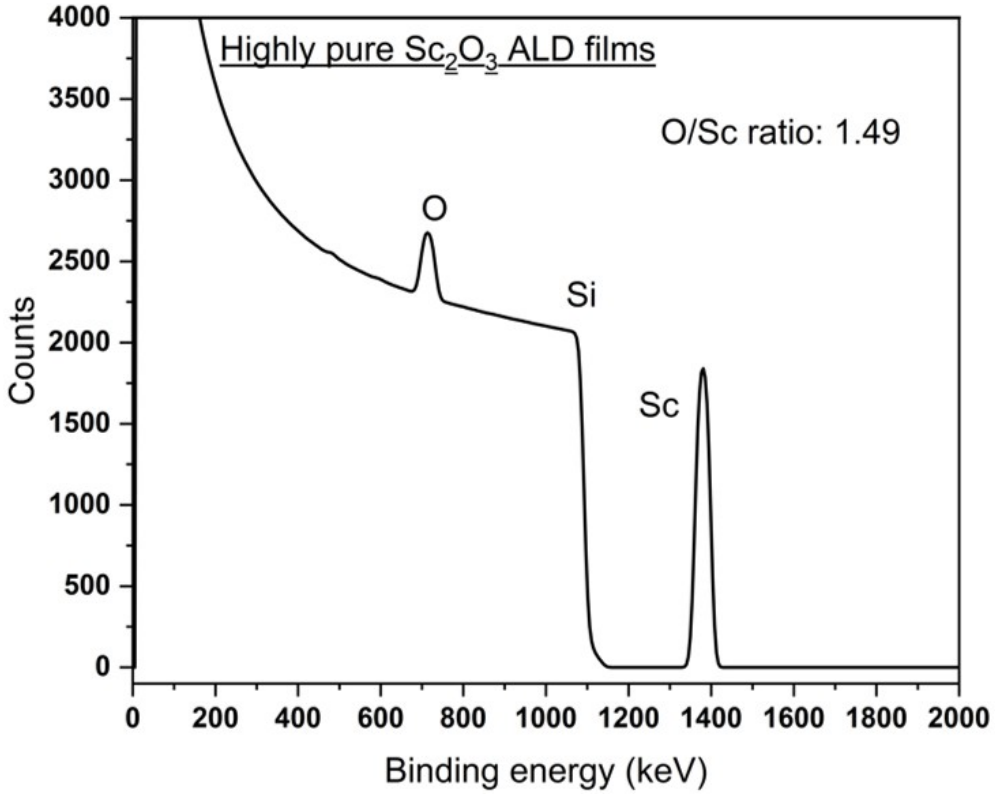
Precursor	Bubbler temp.	Growth temp.	Growth rate AlScN (8% Sc)
Cp3Sc	155 °C	1100 °C	0.006 nm/s
Freya	155 °C	1100 °C	0.015 nm/s
Midgard	100 °C	1100 °C	0.034 nm/s
Asgard	100 °C	1100 °C	0.067 nm/s
Growth of AlScN/GaN at IAF Freiburg (I. Streicher et al., Adv. Funct. Mater. 2024, 2403027.)			

>10x higher growth rate at reduced bubbler temperature!!!

Proof of concept ALD - Sc_2O_3







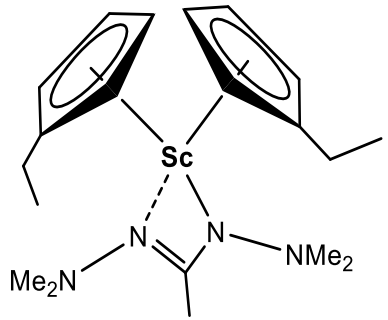
$T_{precursor}$: 130 °C $T_{deposition}$: 230 °C

Asgard 8 s	N_2 purge 20 s	H_2O 1 s	N_2 purge 20 s

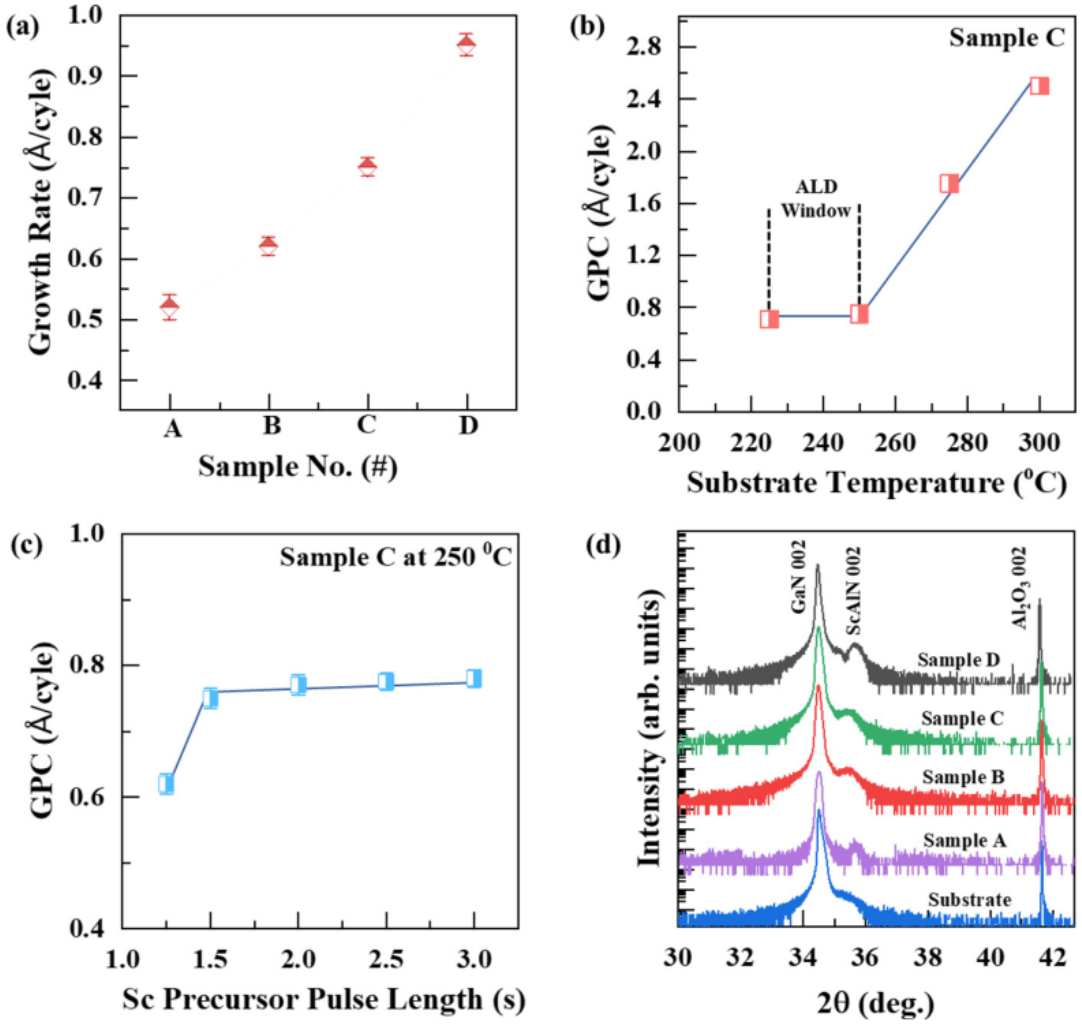
Martin Wilken, Oliver Briel, Michael Nolan and Anjana Devi

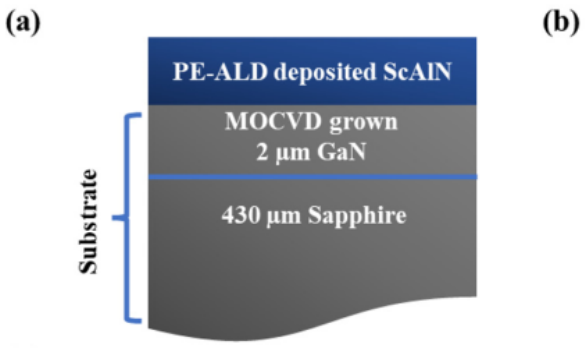
PE-ALD of AlScN

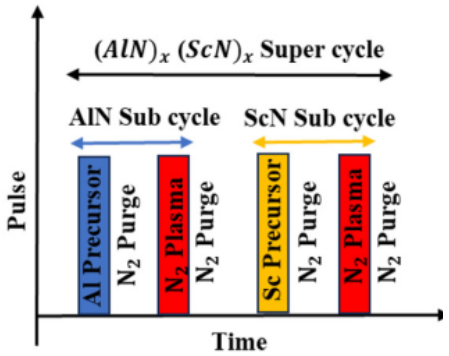
- Up to 25% Sc
  - 1.78% C
  - 3.46% O
- RMS roghness of 0.5 nm
- Small ALD Window
- Piezoelectricity proofen



MIDGARD
(EtCp)2Sc(bdma)

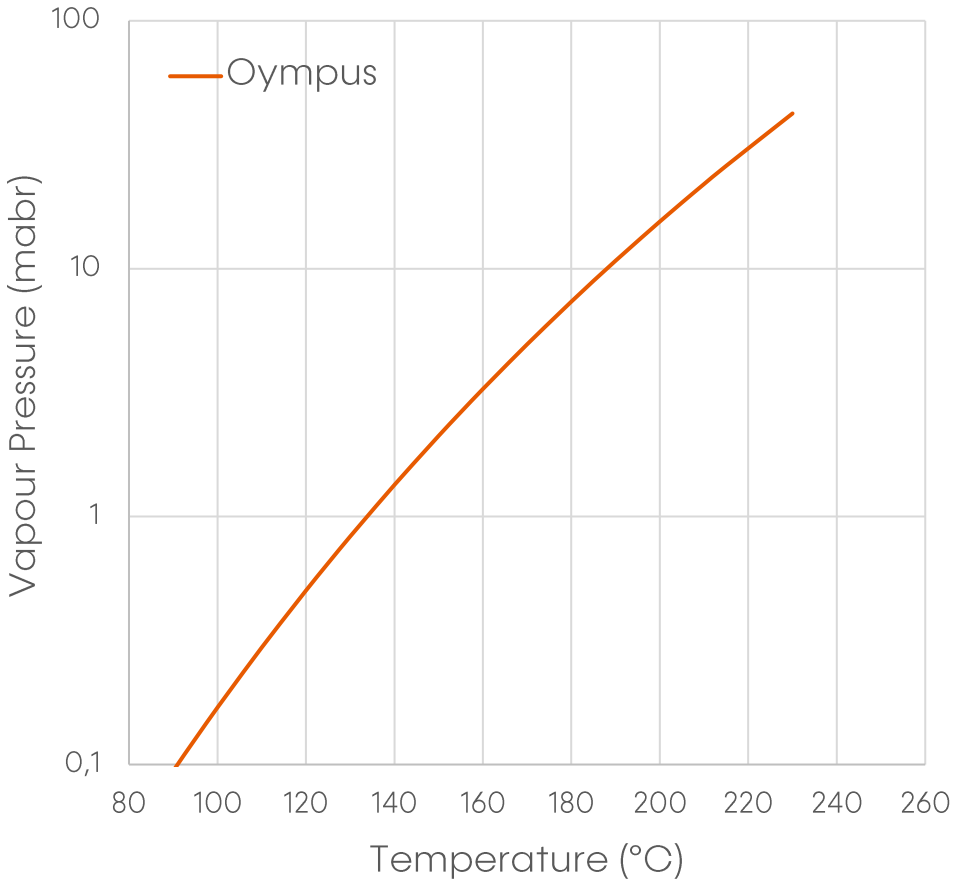






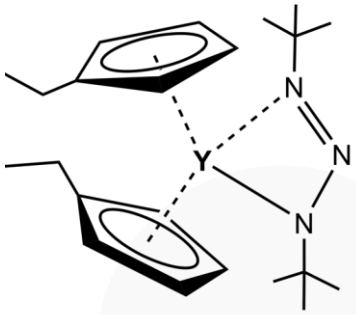
Appl. Phys. Lett. 127, 032109 (2025); doi: 10.1063/5.0278222

Vapour pressure (Olympus)



Similar high volatility as Midgard and Asgard

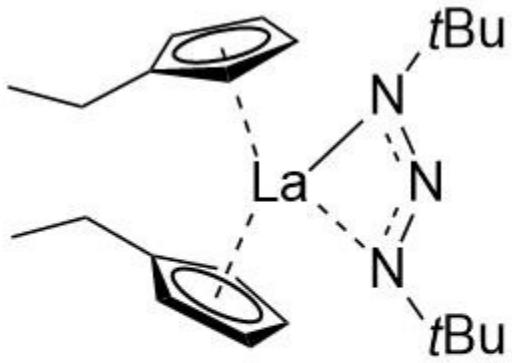
First growth studies with this new precursor are already ongoing, initial studies: AlYN/GaN MOCVD with MCp3Y*



OLYMPUS
(EtCp)2Y(dbt)

* *APL Mater.* 12, 051109 (2024)
https://doi.org/10.1063/5.0203156

(EtCp)2La(dbt)

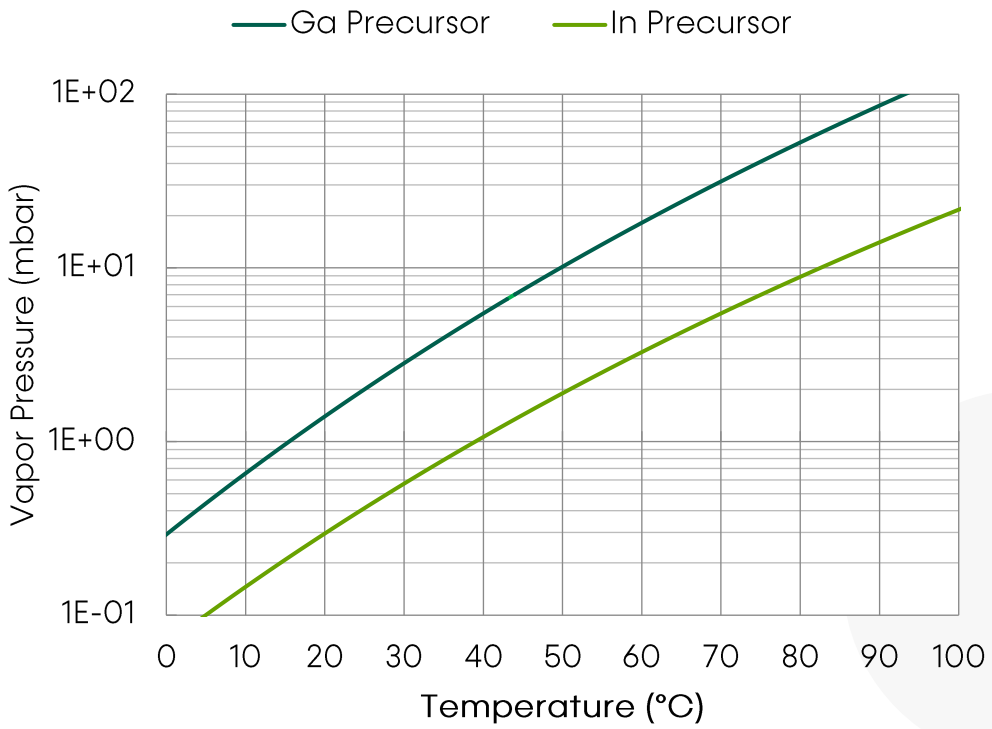


Chemical Formula: $C_{22}H_{36}LaN_3$
Molecular Weight: 481,46

We expect this molecule to be liquid at room temperature with a vapor pressure of 1mbar at around 130°C

Synthesis just started!

Novel Ga and In precursor

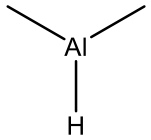


- Liquid at room temperature
- UN 1993, PG II

Alternative Al precursors

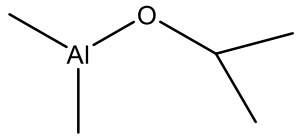
DMAlH:

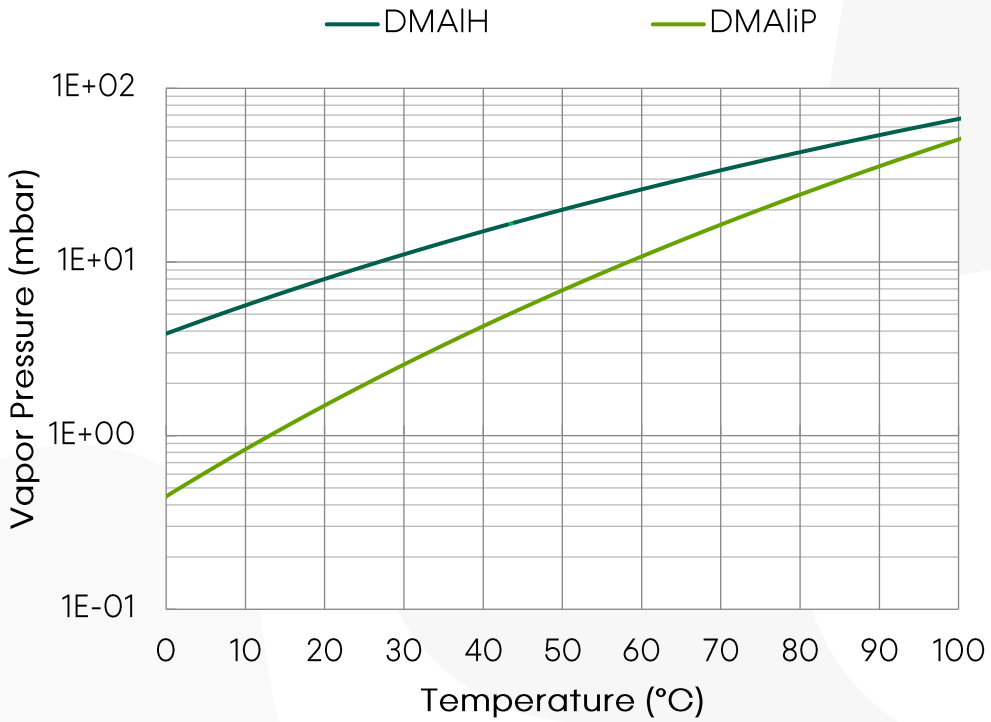
- Liquid
- Boiling point: 154 °C
- Application: Al_2O_3, AlAs



DMAliP:

- Liquid
- Boiling point: 186 °C
- Application: Al_2O_3





Dock

Thank you for your attention!

We are looking forward to your individual request.

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