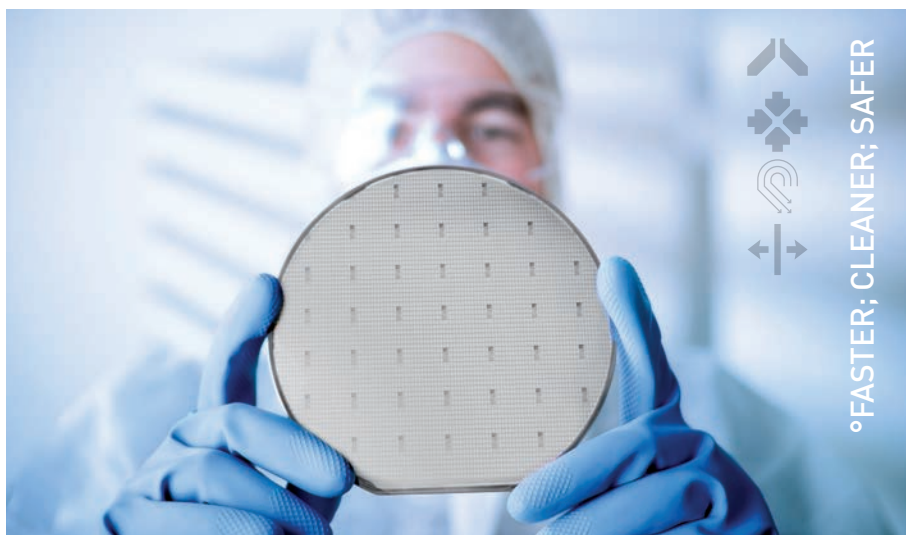


# 'DOCK/ CHEMICALS

SEMICONDUCTORS DECISION



°FASTER; CLEANER; SAFER

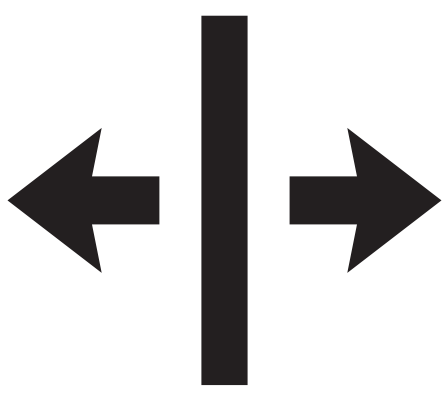
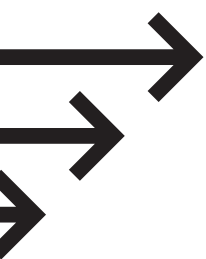
# 'MO-III/V

SEMICONDUCTORS DECISION

# 4H<sub>11</sub>As

HIGH PERFORMANCE PROCESS  
CHEMICALS FOR CVD APPLICATIONS

BP: 68°C / 54°F / 1013 hPa



# LIQUID METAL ORGANICS

FOR THE DECISIVE STEP AHEAD\*

DOCK/CHEMICALS stands for next generation chemistry. As a leading specialist manufacturer of high purity process-chemicals, precisely coordinated with innovative CVD applications we offer our clients comprehensive and highly efficient system solutions through chemicals, equipment and services.

By exactly aligning the chemical design to individual production processes, our clients profit from clear process benefits, a faster time-to-market and a considerably higher performance than in the case of conventional standard process-chemicals. At the same time, our equipment and process solutions ensure highest efficiency, safety and sustainability.

DOCK/CHEMICALS is your innovative and long term partner in developing a new generation of material systems and, with it, new processes and technologies.

**PRODUCTION: °FASTER; CLEANER; SAFER**

# CHEMICALS FOR CVD APPLICATIONS

PRECISELY DESIGNED TO YOUR PROCESS\*

DOCK/CHEMICALS solutions include a wide range of process-chemicals for CVD applications. Please find an extraction below. If you're looking for a special solution, don't hesitate to contact us.

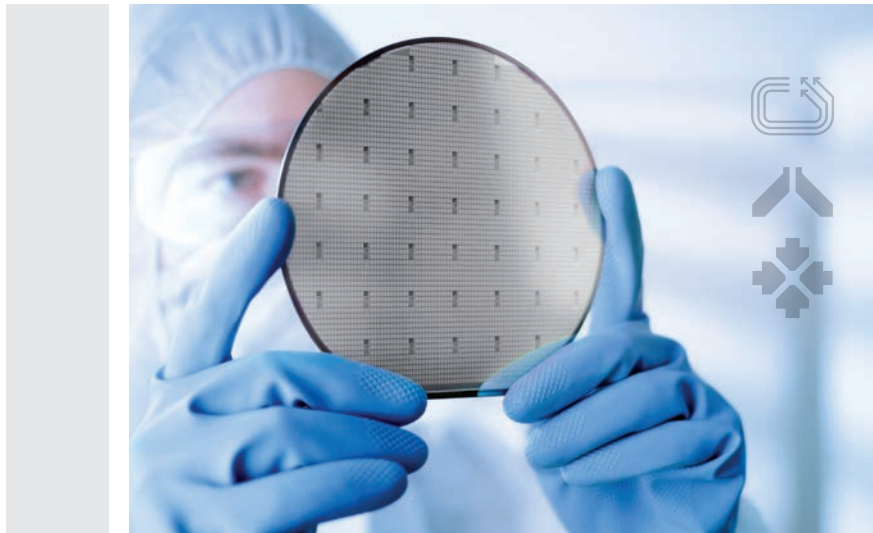
## III/V – PRECURSORS

<b>As – Arsenic</b>	<b>TBAs</b>	Tertiarybutylarsine
	<b>TMA</b> s	Trimethylarsine
<b>P – Phosphorous</b>	<b>TBP</b>	Tertiarybutylphosphine
<b>N – Nitrogen</b>	<b>TBHy</b>	Tertiarybutylhydrazine
	<b>UDMHy</b>	Dimethylhydrazine
<b>Sb – Antimony</b>	<b>TMSb</b>	Trimethylantimony
	<b>TESb</b>	Triethylantimony
	<b>TTBSb</b>	Tri(tertiarybutyl)antimony
	<b>TDMASb</b>	Tri(dimethylamino)antimony
<b>Bi – Bismuth</b>	<b>TMBi</b>	Trimethylbismuth
	<b>TTBBi</b>	Tri(tertiarybutyl)bismuth
<b>B – Boron</b>	<b>TEB</b>	Triethylboron
	<b>TTBB</b>	Tri(tertiarybutyl)boron
<b>Al – Aluminum</b>	<b>TMA</b>	Trimethylaluminum
	<b>TTBAL</b>	Tri(tertiarybutyl)aluminum
<b>Ga – Gallium</b>	<b>TMGa</b>	Trimethylgallium
	<b>TEGa</b>	Triethylgallium
	<b>TTBGa</b>	Tri(tertiarybutyl)gallium
<b>In – Indium</b>	<b>TMI</b> n	Trimethylindium
	<b>DADI</b>	Dimethylaminopropyl-dimethyl-indium

## II/V – PRECURSORS AND DOPANTS

<b>Mg – Magnesium</b>	<b>Cp2Mg</b>	Cyclopentadienylmagnesium
<b>Cd – Cadmium</b>	<b>DMCd</b>	Dimethylcadmium
<b>Fe – Iron</b>	<b>CP<sub>2</sub>Fe</b>	Ferrocene





/SOLUTIONS\*

Zn – Zinc	DMZn DEZn	Dimethylzinc Diethylzinc
C – Carbon	CBr <sub>4</sub> CCl <sub>3</sub> Br	Carbontetrabromide Carbontrichloridebromide
Si – Silicon	DTBSi	Ditertiarybutylsilane
S – Sulfur	DTBS	Ditertiarybutylsulphide
Se – Selenium	DiPSe	Diisopropylselenide
Te – Tellurium	DETe	Diethyltellurium

#### FOR ETCHING AND SELECTIVE AREA GROWTH

Cl – Chlorine	TBCl	Tertiarybutylchloride
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#### CVD AND ALD PRECURSORS, 2D MATERIALS, CUSTOMIZED SYNTHESIS

DOCK/CHEMICALS offers a wide range of common CVD and ALD Precursors (like Hf, Zr, Ta, Ti or W compounds). Please get in touch with us to check on stock availability. Furthermore we are dedicated to R&D and novel process chemistry. Through intensive collaboration we are working on next generation process chemicals for various applications, such as the emerging field of 2D materials and advanced functional materials. We do also offer customized synthesis and collaborative projects designing novel molecules for next generation deposition processes.

# HIGH-TECH EQUIPMENT

FOR HIGHEST PRODUCTIVITY\*

Among the DOCK/CHEMICALS solutions are entire equipment facilities for a secure transport and an efficient use of process-chemicals – from high-quality stainless steel bubblers to compatible heat-exchangers.

'BUBBLER

100

PACKAGING  
& DELIVERY

8000ccm CYL.



## I. STAINLESS STEEL BUBBLERS

Two main types available:

### Dock/10-series

- Standard Bubbler Quality
- EG – Electronic Grade specified
- Various valve setups available

### Dock/100-series

- Superior Bubbler Quality
- EPIGRADE™ specified
- Various valve setups available

Different Volumes ready on stock and customization possible

Net fill vol 150 ccm to 56l

Bubblers also available with level sensing

## II. HEAT-EXCHANGER

For Bubbler Types Dock/10 - 100 series  
Stainless steel TP316L ( $\text{Cr}_{17}\text{Ni}_{12}\text{Mo}_3$ )

- For use of larger bubblers in gas cabinets
- Designed for bubblers sizes > 3000 up to 22000ccm
- Easy to connect to existing thermostats
- Supplied with cooling-liquid by connected thermostad
- Proven solution for highest uptime production

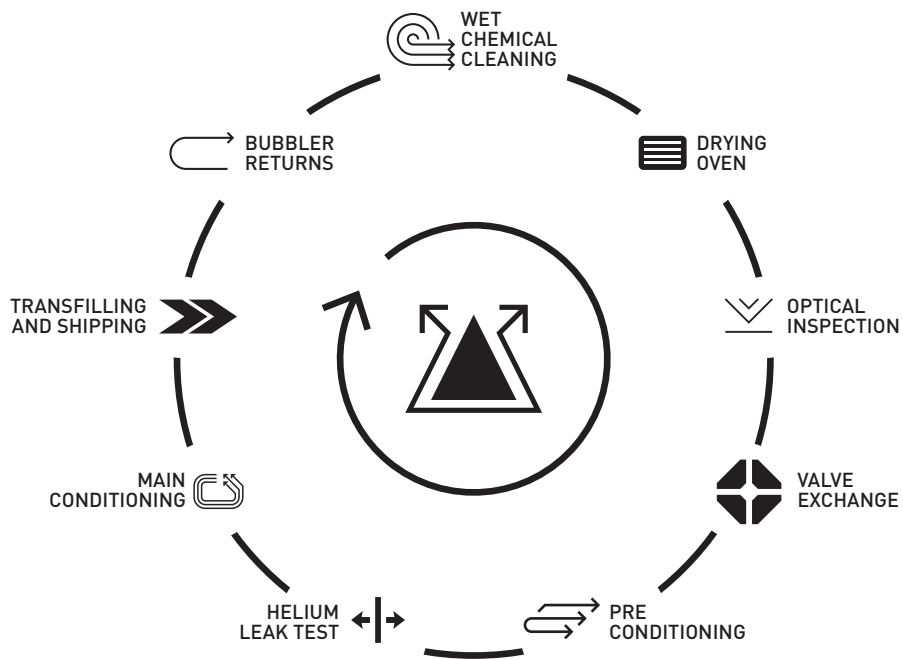
## III. BULK DISTRIBUTION SYSTEMS

- Dedicated equipment solutions for MO-V and MO-III
- Reliable, efficient and safe
- Attractive cost of ownership



/REFURBISHMENT

### Comprehensive Cylinder Management



# TOTAL QUALITY MANAGEMENT

ISO 9001:2008 CERTIFIED\*

Since our foundation, DOCK/TOTAL QUALITY MANAGEMENT SYSTEM has been based on stringent ISO standards and we hold an ISO 9001:2008 certification. Our plant in Marburg/Germany has state-of-the-art production equipment and follows our strict MOCVD-platform approach. Every chemical we produce which reaches semiconductor purity is handled using MOCVD approved equipment and components. In this way we can ensure highest purity and consistency of our processes.

Key to our quality system is the direct link to our customer's processes. Our unique approach is to use epitaxial growth for specification of equipment and quality control.

## EPIGRADE™ SETS THE STANDARD FOR A PROVEN GUARANTEE

EPIGRADE™ qualification is an essential part of the DOCK/TOTAL QUALITY MANAGEMENT SYSTEM. We are committed to improve our products in order to continually exceed the purity and consistency required for successful epitaxy. Our company has defined this unique service to guarantee the proven quality of each batch. Our customers benefit by reduced costs associated with qualification runs and potential down time.

A production batch that is EPIGRADE™ is tested by means of epitaxial growth of reference material systems and test structures specifically designed to be sensitive to impurities which are affecting the electronic and optoelectronic properties.

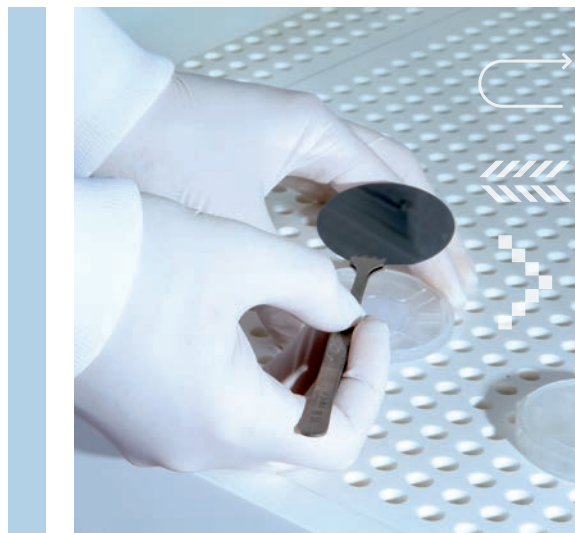
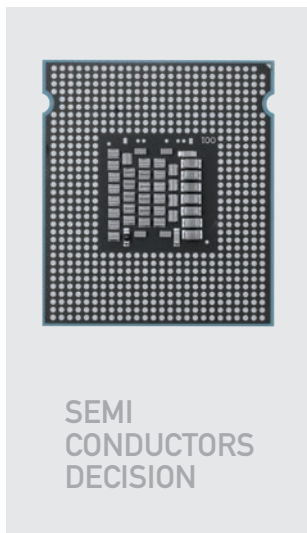
The chosen structures are either sensitive to the majority or minority carrier properties, hence enabling a complete picture of the chemicals used for deposition.

These set of test structures are grown and characterized at independent partners (Philipps University/Marburg and NAsP III/V GmbH) and followed by physical characterization of the deposited compound semiconductor layer structure.

Characterizations routinely performed include: Photoluminescence, Hall-measurement as well as calibrated SIMS. Other characterization methods are available on request.







## GLOBAL SUPPORT BASED ON COMPETENCE AND EXPERIENCE

DOCK/CHEMICALS provides globally competent support to our customer base. This includes regular personal contacts with our expert team as well as an optimized supply chain through global warehouses from the delivery of product to the return of the used cylinder.

### Marburg, Germany Headquarter

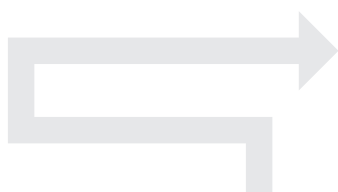
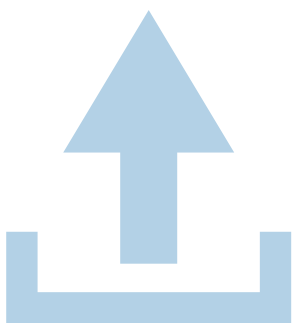
- R & D, production and refinement of chemical materials
- Transfilling, bubbler refurbishment, dispatch
- MOCVD cooperation

### US

- Warehouse & dispatch

### AP

- Trading partners in China, Japan, Taiwan, Korea, Singapore, India



# HIGHEST PERFORMANCE

WITH ULTRA PURE CHEMICALS\*

DOCK/CHEMICALS are the innovative solutions of the German Dockweiler Chemicals GmbH. As a certified supplier of process-chemicals the company has a longstanding and path-breaking competence in the manufacturing of highly purified, liquid metalorganic compounds for CVD applications, whose qualities correspond precisely to the requirements of production processes.

Many years of research give Dockweiler Chemicals access to true innovation in material systems and, with that, the basis for the next generation of high performance semiconductors.

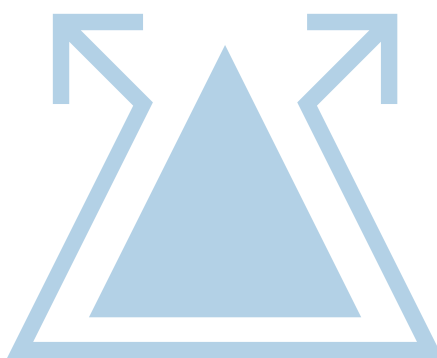
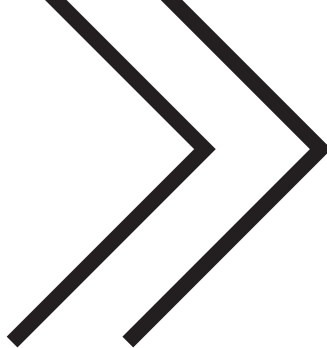
Dockweiler Chemicals GmbH is integrated within a large innovation network. Among them are well-known partners such as those in the material system leading Philipps-Universität Marburg or Dockweiler AG, one of the world's leading manufacturers of stainless steel tube systems.

## °SEMICONDUCTORS:DECISION

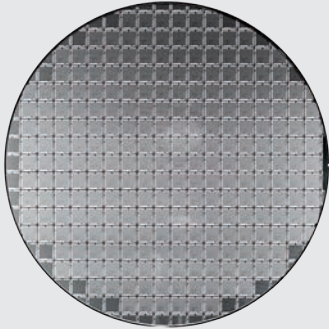
### **DOCKWEILER CHEMICALS GmbH**

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F +49 6421 39 -6381  
sales@dockchemicals.com

**For your individual requests, our service team is available to you at the contact information above. We look forward to hearing from you!**



HIGH PERFORMANCE PROCESS  
CHEMICALS FOR CVD APPLICATIONS



INNOVATIVE MO-III/V  
CHEMICAL COMPOUNDS

CUSTOMIZED  
CHEMICAL  
SYSTEMS\*

8000ccm CYL.

'BUBBLER

100

PACKAGING  
& DELIVERY

10



SEMICONDUCTORS DECISION

# TERTIARYBUTYLARSINE#

DOCK/CHEMICALS are ultrapure process-chemicals for CVD applications, such as compounds of As, P, N, Sb, In, Si: transition metals and rare earth.

Our solutions include commissioned synthesis and refinement, as well as handling, storage, transfilling, dispatch and waste management of toxic, pyrophoric and corrosive chemicals.

**'DOCK/  
CHEMICALS**  
SEMICONDUCTORS DECISION

EPIGRADE™



[www.dockchemicals.com](http://www.dockchemicals.com)