2023-2024 CMR™ ALD/CVD, Hi K and Metal Precursor

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RESEARCH METHODOLOGY

TECHCET employs subject matter experts having first-hand experience within the industries which they analyze. Most of TECHCET's analysts have over 25 years of direct and relevant experience in their field. Our analysts survey the commercial and technical staff of IC manufacturers and their suppliers, and conduct extensive research of literature and commerce statistics to ascertain the current and future market environment and global supply risks. Combining this data with TECHCET's proprietary, quantitative wafer forecast results in a viable long-term market forecast for a variety of process materials.

READER'S NOTE

This report represents the interpretation and analysis of information generally available to the public or released by responsible agencies or individuals. Data was obtained from sources considered reliable. However, accuracy or completeness is not guaranteed.

ANALYST BIOGRAPHY

Jonas Sundqvist, Ph.D. & Assoc. Prof. – Sr. Technology Analyst of TECHCET— covers Electronic Gases and ALD & CVD precursors and related technologies, and the co-chair of the Annual Critical Materials Council (CMC) Conference. His over 20 years of work experience includes Group Leader of the Thin-Film Technologies Group at The Fraunhofer Institute for Ceramic Technologies and Systems (IKTS) in Germany, Clean Room Operations Manager for Lund Nano Lab, Lund University in Sweden and Group Leader of the ALD & High-k devices group at Fraunhofer's Center Nanoelectronic Technologies (CNT) in Germany, which included 28nm node work for GLOBALFOUNDRIES Fab1.

Previously, at Infineon Memory Development Centre (MDC), he developed high-k and metal nitride ALD processes, and at Qimonda, he was a materials manager focused on the ALD/CVD precursors supply-chain. He holds a Ph.D. and an M.S. in inorganic chemistry from Uppsala University, Sweden & Institute for Micromanufacturing, Louisiana Teche, USA, a B.S. in electrical and electronics engineering from Lars Kagg, and nine patents and 40 related scientific publications.

Jonas Sundqvist is Assoc. Prof. at Linköping University, on the Scientific Committee for AVS ALD and has co-chaired ALD2016 Dublin Ireland, and the annual EFDS ALD for Industry Workshop in Germany and Co-Chair for the annual CMC Conference.

Jonas Sundqvist, Ph.D.
Sr. Technology Analyst of TECHCET,
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TABLE OF CONTENTS

Table of Contents

Table of Contents

FIGURES & TABLES

FIGURES

FIGURES & TABLES

FIGURES & TABLES

TABLES

FIGURES & TABLES

TABLES

2
Scope, Purpose and Methodology

2.1 SCOPE

- This report provides market and technical trend information on inorganic gases and liquid CVD/ALD precursors (metal, metal oxide, high K, dielectric and SOD materials). For the last 20 years, there have been many research papers and patents published regarding ALD and CVD precursors specifically for the semiconductor industry. This report includes detail on the development path and roadmaps for new precursors and any current EHS and regulatory hurdles for these materials to enter into high volume manufacturing (HVM).
- Forecasts are provided on precursors of all types, with a focus is on the leading-edge front end of the line insulating and conductive materials, including high K, metal electrode, interconnect metallization, sacrificial layers, low-κ dielectrics, hard masks, mandrel, and etch stop layers. These process areas are of interest because of the high growth potential associated with leading-edge logic <45 nm, 28 nm to 10/7 nm nodes, and the future 5 & 3 nm nodes, as well as advanced DRAM and 3DNAND volatile and non-volatile memories.

2.2 PURPOSE

- This Critical Materials Report™ (CMR) provides focused information for supply-chain managers, process integration and R&D directors, as well as business development managers, and financial analysts. The report covers information about key suppliers, issues/trends in the material supply chain, estimates on supplier market share, and forecast for the material segments.

2.3 METHODOLOGY

- TECHCET employs subject matter experts having first-hand experience within the industries which they analyze. Most of TECHCET's analysts have over 25 years of direct and relevant experience in their field. Our analysts survey the commercial and technical staff of IC manufacturers and their suppliers and conduct extensive research of literature and commerce statistics to ascertain the current and future market environment and global supply risks. Combining this data with TECHCET's proprietary, quantitative wafer forecast results in a viable long-term market forecast for a variety of process materials.

2.4 Overview of Other TECHCET CMR™ Reports

- TECHCET produces electronic material supply chain reports each year as one of its functions for the Critical Materials Council. Reports to be published in 2022 can be found at www.techcet.com and are listed in the table below:

TECHCET's Critical Materials Reports™	
1	CMP Consumables (Pads & Slurry)
2	CMP Equipment Ancillaries (Conditioners, Filters, etc.)
3	CVD /ALD Hi K Precursors
4	CVD DIELECTRIC Precursors
5	Equipment Components – Quartz
6	Equipment Components – Silicon
7	Equipment Components – SiC/Ceramics
8	Gases - Electronic Specialty, Bulk & Rare Gases
9	Metal Plating Chemicals
10	Photoresists, Ancillaries & Extension Materials
11	Sputtering Targets
12	Wafers: Silicon, SOI
13	SiC Wafers & Manufacturing
14	Wet Chemicals / Specialty Cleans
15	Special Reports: Impact of US Expansions on Wet Chemicals Supply Chains