

Electronic Chemicals— Semiconductors, Silicon and IC Process Chemicals

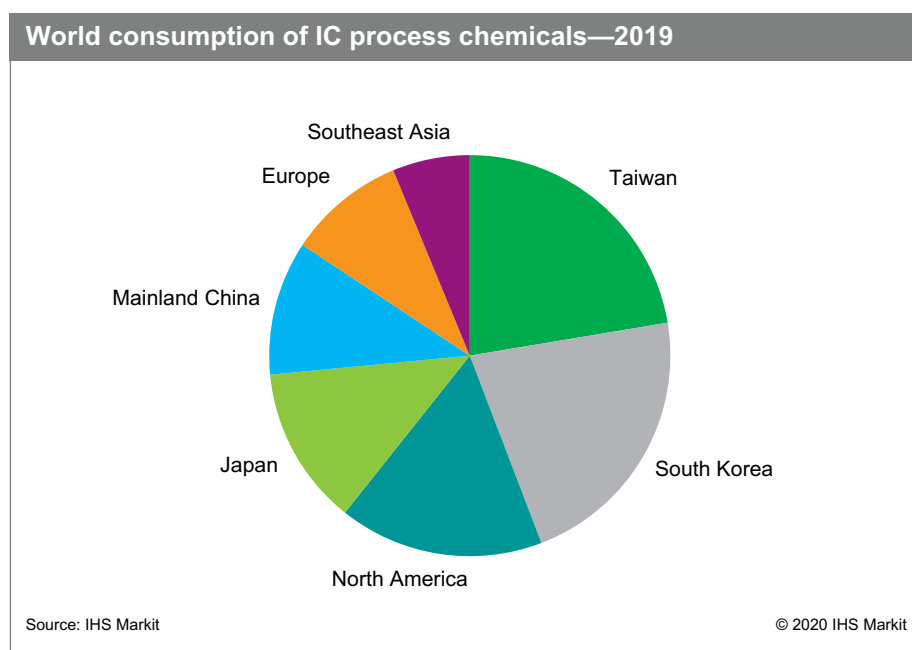
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Abstract

The electronics industry uses a broad range of highly sophisticated specialty chemicals in many processing steps in the manufacture of electronic components and products, including silicon wafers and integrated circuits, for packaging and printed circuit boards (PCBs), in the manufacture of compound semiconductors and optoelectronics, and in the production of flat panel display products. This report covers the major specialty chemicals consumed in the production of integrated circuits or silicon chips, including silicon wafers, atmospheric and specialty gases, photoresists, ancillary chemicals, wet-processing chemicals, CMP slurries, thin film metals, copper plating chemicals, and new chemicals and precursor materials for low-k and high-k dielectrics.

In 2019, consumption of silicon wafers accounted for the largest share of total electronic chemical consumption, followed by atmospheric and specialty gases, CMP slurries and pads, wet-processing chemicals, photoresist ancillary chemicals, photoresists, thin film metals, and others. In 2019, the largest IC process chemical consuming region was Taiwan, followed by South Korea, the United States, Japan, mainland China, Europe, and Southeast Asia.

The following pie chart shows world consumption of IC process chemicals:



Growth in the consumption of IC process chemicals is driven by increases in installed fab capacity and processed silicon wafer surface area, as well as by more expensive chemicals consumed by new technology. Increased technology efficiency provided by the semiconductor equipment industry is leading to lower material usage per silicon wafer surface area. At the

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same time, well-proven and mature product lines from photoresists, wet-processing chemicals, atmospheric gases, CMP slurries, and sputtering targets are experiencing severe price pressures.

In 2000, about three-quarters of the world market for electronic chemicals was concentrated in the United States, Western Europe, and Japan. This dominance rapidly eroded as other Asian nations emerged as producing regions, claiming a share of about 61% of world consumption of IC process chemicals in 2019. This trend was fueled by the growing global consumer electronics market, the growing consumer electronics production industry in Asia, and a strategy change of US, European, and Japanese integrated device manufacturers that turned to asset-light or fabless strategies and outsourced production to foundries in Taiwan, South Korea, mainland China, and Singapore.

Global consumption of IC process chemicals is expected to grow at a compound annual rate of 4–5% through 2025, powered primarily by the following:

- 5th Generation (5G) mobile network. This is a new global wireless standard expected to enhance mobile broadband connectivity, mission critical communication, and Internet of Things (IoT) through faster speed, superior reliability, and negligible latency. 5G will drive demand for semiconductors, along with related technologies such as MEMs and sensors, LEDs, and flexible display technologies.
- Increased demand for computational and data processing, which in turn will require servers, mobile PCs and tablets.
- Automobiles equipped with ADAS (Advanced Driver-Assistance Systems) today and fully self-driving cars in the distant future.

These drivers will enable further growth in connectivity of devices and systems in the Internet of Things (IoT).

In addition to the above technology drivers, the semiconductor industry in mainland China will play a significant role in the growth of the global semiconductor industry and the chemicals suppliers that serve it. Beginning in 2011, the mainland Chinese government implemented policies to support its semiconductor industry, particularly in IC manufacturing and design industry. The production of ICs in mainland China will accelerate at an average annual rate of above 10% through 2025.

For more detailed information, please see the table of contents listed below.

IHS Markit's Specialty Chemicals Update Program – *Electronic Chemicals—Semiconductors, Silicon, and IC Process Chemicals* is the comprehensive and trusted guide for anyone seeking information into this industry. This latest report details global and regional information, including



Industry structure,
operating characteristics
and regulatory
environment



Products, functions
and markets



Cost structure/
profitability



Technology changes
and emerging
substitution practices



Quantitative market
analysis and forecasts

Key Benefits

IHS Markit's Specialty Chemicals Update Program – *Electronic Chemicals—Semiconductors, Silicon, and IC Process Chemicals* has been compiled using primary interviews with key suppliers and organizations, and leading representatives from the industry in combination with IHS Markit's unparalleled access to upstream and downstream market intelligence and expert insights into industry dynamics, trade, and economics.

This report can help you

- Identify the competitive environment and key players
- Assess key issues facing both suppliers and their end-use customers
- Understand industry integration strategies
- Keep abreast of industry structure changes, regulatory requirements, and other factors affecting profitability
- Identify new business opportunities and threats
- Follow important commercial developments
- Recognize trends and driving forces influencing specialty chemical markets

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