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OVERVIEW OF ELECTRONIC PACKAGING MARKET IN CHINA

Introduction of Electronic Packaging

Electronic packaging is the technology of designing and manufacturing protective enclosures for electronic devices (ranging from single semiconductors to complex systems). It employs thin-film technology and micro-connection techniques to arrange, secure, and interconnect three foundational components — chips, substrates, and printed circuit boards (PCBs) — alongside other electronic elements on frames or substrates. As a critical step in electronics manufacturing, electronic packaging mainly achieves electrical interconnections, physical protection, thermal management, mechanical support and fixation, and integration. The market size of electronic packaging market in China reached RMB600.5 billion in 2024 and is expected to increase to RMB907.7 billion in 2029. The hierarchy of electronic packaging can be categorized into wafer-level packaging (WLP), chip-level packaging, PCB assembly, and module and system assembly. Among them, the wafer-level packaging and chip-level packaging are classified as semiconductor packaging. These levels are interconnected processes along the value chain of electronics manufacturing.

Wafer-level packaging refers to an advanced semiconductor packaging technology which implements the packaging process at the wafer level. Two critical processes involved in WLP are photolithography and metallization. Photolithography is used to define patterns on the wafer surface for creating structures required for packaging, while metallization is used to create electrical interconnects such as Redistribution Layers (RDL), Under-Bump Metallization (UBM), and Bumping, which connect the chip to external circuits. After wafer dicing, individual semiconductor dies need to be packaged. Chip-level packaging is the process of encapsulating and interconnecting a die to a substrate, which usually is a organic substrate, ceramic substrate, glass substrate, leadframe substrate, or silicon interposer. Chip-level packaging converts the die into independent, reliable, and easy-to-handle electronic devices, enabling safe electrical and mechanical connections with higher-level circuit systems.

Following chip-level packaging, PCB assembly involves assembling and interconnecting devices, along with other discrete electronic components, onto a PCB according to circuit design requirements. This forms electronic modules or circuit boards with specific functions or subsystems. Typical types of PCBs used at this stage include single-sided/double-sided PCBs, multiplayer PCBs, HDI, and flexible and rigid-flex PCBs. In PCB assembly, PCBs are separately produced based on several sequential processes to transform raw materials into functional electronic boards, including printing, etching, drilling, plating, solder mask application, and surface finish. Module and system assembly is the stage where relevant components are assembled into a fully functional electronic device.

Introduction of Advanced Packaging

Advanced packaging represents an important direction in the evolution of semiconductor packaging technology and is a key driving force for continuously improving chip performance and system integration in the post-Moore's Law era. Advanced packaging is a collective term for advanced semiconductor packaging technologies that go beyond traditional wire bonding packaging techniques. It aims to break through the bottlenecks of traditional packaging to meet the growing demand for higher performance, smaller size, lower power consumption, and higher integration in electronic systems. Typical advanced packaging platforms include: (a) Flip Chip Packaging (FC), which connects the active side of the chip directly to the packaging substrate or circuit board, achieving electrical connections through solder balls; It can significantly improve signal transmission speed and reduce power consumption, and is able to increase packaging density, allowing more chips to be integrated within a limited space; (b) Wafer-Level Chip Scale Packaging (WLCSP), which refers to the technology of packaging an integrated circuit at the wafer level, instead of the traditional process of assembling individual units in packages after dicing them from a wafer. It is an extension of the wafer fab process, where the device interconnects and protection are accomplished using the wafer fab processes and tools; In the final form, the device is a die with an array pattern of bumps or solder balls attached at an I/O pitch that is compatible with subsequent PCB assembly processes; and (c) 2.5D and 3D Packaging; 2.5D Packaging uses a silicon interposer to connect different chips, enabling high-speed communication between chips; 3D packaging, on the other hand, vertically stacks chips inside the chip using Through-Silicon Via (TSV) technology, further reducing size and improving performance; Both technologies allow for stacking and interconnecting chips in three-dimensional space, but 3D packaging offers higher integration and more complex system design capabilities. Although 2.5D and 3D packaging technologies have higher costs and manufacturing complexities, they provide strong support for HPC, mobile devices, and memory applications.

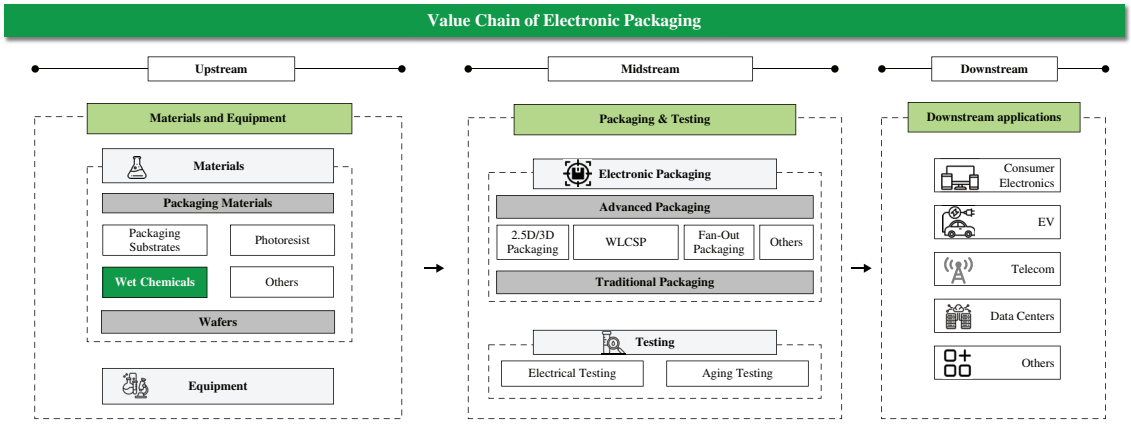
To realize the aforementioned advanced packaging platforms, the following interconnect processes are required to establish internal and external connections between chips. The mainstream key interconnect technologies currently include RDL, Through-Silicon Via (TSV), Through-Glass Via (TGV), Through-Ceramic Via (TCV), Bumping, and UBM. By working synergistically, they drive advancements in chip packaging toward smaller dimensions, higher integration, and superior performance, providing critical support for advanced applications such as HPC, AI, and 5G communications.

The key process technologies in advanced packaging include: (a) RDL. RDL refers to the technology of forming conductive metal layers on the wafer surface to create metal wiring, thereby enabling the redistribution of I/O electrodes for electrical connection between the chip and external components. The main applications of RDL include flip-chip, 2.5D/3D packaging, WLCSP. (b) TSV/TGV/TCV. Based on different substrate materials, common through-hole technologies include TSV, TGV, and TCV. Among these technologies, TSV is recognized as one of the most critical technologies for achieving 2.5D/3D advanced packaging, as it effectively shortens the signal transmission distance between chips, enabling superior electrical performance, smaller physical size, and lighter weight. The main applications of TSV/TGV/TCV include 2.5D/3D packaging. (c) Bumping. Bumps are the primary interface in advanced packaging of integrated circuits, playing roles such as mechanical connection, electrical connection, and serving as a heat dissipation channel within the entire packaging structure. The process of creating bumps is referred to as bumping. Compared with wire bonding technology, bumping technology allows for the creation of bumps with smaller pitches, significantly increasing the I/O density of chip packaging, making it more suitable for high-speed signal transmission. The main applications of bumping include flip-chip, 2.5D packaging, WLCSP. (d) UBM. UBM is an conductive interface that ensures a reliable connection between the micro-scale electrical pads on the chip and the much larger solder balls that will eventually connect the chip to a substrate or PCB. The main applications of UBM include flip-chip, WLCSP.

The market size of advanced packaging market in China increased from RMB35.1 billion in 2020 to RMB69.8 billion in 2024, representing a CAGR of 18.7% in the same period. This growth during this period is mainly driven by the demand for emerging technologies such as 5G, the Internet of Things, and AI, as well as the increasing demand for HPC and storage solutions. From 2024 to 2029, the market is expected to grow to RMB170.5 billion by 2029, with a CAGR of 19.6%. During this period, as electronic devices evolve towards higher performance, smaller size, and lower power consumption, it will further drive rapid market growth. The percentage of advanced packaging within the overall electronic packaging market in terms of revenue in China increased from 7.8% in 2020 to 11.6% in 2024 and is expected to increase to 18.8% in 2029. Key process technologies, such as RDL, TSV, and Bumping, which rely on wet process plating chemicals for metal deposition and interconnect formation, constitute the fundamental interconnection technology stack of advanced packaging architectures and performance enhancement. As advanced packaging continues to scale in complexity and adoption, the resulting increase in interconnect density and process intensity is expected to directly drive demand growth for wet process plating chemicals.

Value Chain of Electronic Packaging Market in China

The upstream of the value chain of electronic packaging industry in China mainly involves the provision of materials and equipment. The midstream focuses on packaging and testing, covering various platforms from traditional packaging to advanced packaging, such as 2.5D/3D packaging, wafer-level chip scale packaging, and fan-out packaging. The downstream encompasses applications for semiconductors and electronic products, including industries such as consumer electronics, EV, telecom, and data centers.



Source: Frost & Sullivan

OVERVIEW OF WET PROCESS PLATING CHEMICALS MARKET IN CHINA

Introduction of Wet Process Plating Chemicals

The wet process refers to a set of techniques that utilize liquid-phase chemicals for cleaning surface treatment or material deposition. Wet process plating chemicals, which are a typical type of wet chemicals, refer to the chemical substances used for depositing thin layers of metals or alloys onto a surface in wet processing of semiconductor and PCB manufacturing. As one of the critical materials for electrical signal transmission within semiconductors and between semiconductors, packaging substrates, and PCBs, wet process plating chemicals play vital roles in mechanical connection, electrical connection, and heat dissipation of electronic components, especially semiconductors. Such semiconductors include, among others, logic ICs (such as CPU/GPU/NPU), memory (such as high-bandwidth memory), discrete semiconductors (such as power devices), and sensors (such as CMOS image sensors), which are further used in applications such as AI data centers, electric vehicles, industrial, or robots. Moreover, in electronic packaging, dry processes, represented by Atomic Layer Deposition (ALD), Chemical Vapor Deposition (CVD), and Physical Vapor Deposition (PVD), and wet processes are not competitive but complementary. Dry processes deposit ultra-thin, highly adhesive seed or barrier layers through gas-phase reactions, forming the initial metal foundation on nonmetallic substrates. Wet processes subsequently build the bulk interconnect metals on top of these seed layers through solution-based chemical deposition to form functional routing structures. Dry deposition supports high-precision, ultra-thin films with tight line widths and critical dimensions, whereas wet plating process supports high-throughput, cost-effective formation of thicker interconnect layers with relatively larger feature sizes. Across electronic packaging workflows, dry processes and wet processes form a sequential and interdependent manufacturing chain rather than a substitutive or competitive relationship.

Electroless plating and electroplating are two major process technologies for plating in wet process. Electroless plating is a chemical process that deposits a uniform metallic coating onto a surface without the use of an external electrical current. It uses a chemical reducing agent in the plating solution to convert metal ions into a metallic layer on the surface of the object. The advantages of electroless plating includes exceptional coating uniformity, high processing efficiency, and relatively low total costs. Electroless plating has high technological barriers as it requires precise control over the chemical reactions to ensure both uniform coating and excellent interfacial adhesion. Unlike electroplating where an external current provides a degree of control over deposition, electroless plating relies solely on the delicate balance of chemical reactions within a solution. The precise control over the chemical reactions is particularly challenging for applications on wafers and packaging substrates, which usually have more stringent requirements on performance of chemicals.

Electroplating is a process that utilizes an electric current to deposit a thin layer of metal onto the surface of a conductive object. The significant advantages of electroplating include, among others, high and controlled deposition rate and precise control over coating thickness, making it a unique and valuable process in creating highly precise and complex patterns, which is fundamental to the manufacturing of PCBs and semiconductor devices. In particular, electroplating dominates the fabrication of nanoscale copper interconnects in logic integrated circuits due to its efficiency in filling high aspect ratio nanoscale structures. Moreover, a wide range of metals can be electroplated, including copper, nickel, gold, silver, tin, and various alloys. When applying electroplating in electronic manufacturing, it is critically important to consider the adhesion and interaction between multiple plated layers, as well as their collective impact on the overall functionality of a product, including electrical performance, stress, and other relevant properties.

Both electroless plating and electroplating exhibit substantial growth potentials, and, in practice, are applied in a complementary manner. They deliver diversified solutions for plating in wet process of electronic packaging, to meet different plating requirements in specific processes. In wet plating processes, terms such as ENIG, ENEPIG, electroless copper, electroless tin, electroless silver, and various electroplating processes refer to ways of deposition and the type of metal on the semiconductor substrate or PCB. These processes generally use a combination of chemicals in a multi-step manner, typically involving cleaning, degreasing, micro-etching, activation, catalyzation, acceleration, metal deposition, rinsing, and post-treatment. To support these steps, a broad range of wet chemicals is required, including complexing agents, reducing agents, stabilizers, accelerators, brighteners, leveling agents, surfactants, pH regulators, and various additives that control grain structure and deposition kinetics. Thus, a process such as ENIG does not operate with merely "nickel" and "gold" ion containing solution; rather, it depends on an integrated chemical system that enables each stage of the deposition in a sequential manner. The same applies to other electroless and electroplating processes, where the final metal layer name represents the end result, while the actual wet process involves a comprehensive set of chemical materials to achieve stable, reliable, and high-quality deposition. The tables set forth below illustrate the major specific plating processes and the introduction, typical applications, and technology barrier of such plating processes.

Introduction of Major Electroless and Electroplating Processes

Specific electroless process	Introduction of plating process	Typical applications	Technology barrier
Electroless Nickel Immersion Gold (ENIG)	– Dual-layer metal surface treatment – Creating a stable, bright, smooth, and highly solderable nickel-gold coating – Providing a surface ideal for soldering; protecting the substrate from oxidation and corrosion – Used in metallization for power device and CIS packaging and WLP for mobile applications	Semiconductor: – Advanced packaging: UBM – Substrate surface finish PCB: Surface finish	Semiconductor: ★★★★★ PCB: ★★★
Electroless Nickel/Electroless Palladium/ Immersion Gold (ENEPIG)	– Three-layer structure with an additional palladium layer – Preventing the concentrated displacement reaction between gold and nickel – Suitable for products requiring multiple reflow soldering cycles	Semiconductor: Advanced packaging: UBM PCB: Surface finish	Semiconductor: ★★★★★ PCB: ★★★★
Electroless copper	– Creating the initial conductive layer on the walls of drilled holes of PCBs to allow subsequent plating process	PCB: Hole metallization	PCB: ★★
Electroless Tin	– Providing a uniform, lead-free, and highly solderable tin layer – Protecting copper traces and pads, ensuring excellent solderability in component mounting	PCB: Surface finish	PCB: ★★★
Electroless silver	– Electroless silver: used in surface finish for solderability and corrosion protection	PCB: Surface finish	PCB: ★★★

Specific electroplating process	Introduction of plating process	Typical applications	Technology barrier
Copper electroplating	– High-precision and efficient process that forms the bulk of the conductive copper used in PCBs and advanced packaging – Serving as the most widely adopted metal interconnection technology, and enabling the complex circuitry and interconnects necessary for electronics	Semiconductor: Advanced packaging: TSV, RDL, UBM, and bumping PCB: – Multi-layer PCB fabrication – Through-Hole Plating (PTH), via filling, and pattern plating	Semiconductor: ★★★★★ PCB: ★★★★
Nickel electroplating	– Electrolytic deposition of a nickel layer onto a conductive substrate – Serving as a robust barrier layer and underlayer for other metals, providing crucial properties like diffusion resistance, hardness, corrosion protection	Semiconductor: Advanced packaging: UBM and bumping PCB: Surface finish	Semiconductor: ★★★★★ PCB: ★★★
Gold electroplating	– Electrolytic deposition of a gold layer onto a conductive substrate – Unique combination of properties – excellent conductivity, corrosion resistance, and solderability	Semiconductor: Advanced packaging: RDLs, UBM, Via conformal plating, and bumping PCB: Surface finish	Semiconductor: ★★★★★ PCB: ★★★
Tin/Silver electroplating	– Electrolytic deposition of an alloy composed primarily of tin and a small percentage of silver – Creating lead-free solder bumps and interconnects in advanced packaging	Semiconductor: Advanced packaging: bumping	Semiconductor: ★★★★★

Note: the number of stars (★) denotes the degree of technology barrier. The quantitative basis for evaluating the degree of technology barriers is the number of suppliers capable of delivering qualified, mass-production-ready solutions for a given plating process. When only a limited number of vendors are able to commercialize a process at scale, it typically indicates higher technical difficulty. The scarcity reflects the complexity of formulation design, the challenges in achieving stable deposition kinetics, and the extensive validation required to meet reliability specifications in semiconductor and PCB manufacturing. "Five stars", "Four stars", "Three stars", and "Two stars" in the table represent that there are fewer than five suppliers, five to ten suppliers, 11 to 20 suppliers, and more than 20 suppliers, respectively, for a specific process.

Market Size of Wet Process Plating Chemicals Globally

From 2020 to 2022, the market size of global wet process plating chemicals market grew from RMB39.9 billion to RMB44.4 billion. From 2022 to 2023, due to the short-term declining demand in the semiconductor and PCB industries, the total market size decreased to RMB38.0 billion in 2023. However, in 2024, driven by the rising demands of downstream industries, the global wet process plating chemicals market rebounded to RMB40.7 billion. Going forward, the global wet process plating chemicals market is expected to reach RMB73.7 billion in 2029, representing a CAGR of 12.6% from 2024 to 2029.

Market Size of Wet Process Plating Chemicals Market in China

As China has become a critical manufacturing hub of semiconductors and PCBs around the world, China is an important market for wet process plating chemicals, contributing a large portion of revenue of the global market. Same as the global market, the wet process plating chemicals market in China experienced a short-term decline in 2023 due to weakened demands of the consumer electronics market, which is a major end-use application and contributes a significant revenue of the semiconductor and PCB market in China and globally. However, fueled by the rapid growth of multiple end-use applications, such as AI, EV, data centers, which have increasing demands of semiconductors and PCBs, the market had rebounded in 2024 and the market size of wet process plating chemicals in China increased to RMB15.0 billion in the same year. The rapid development of emerging applications such as AI and EV is expected to further drive the growth of future demands for wet process plating chemicals in China. The market size of wet process plating chemicals in China is expected to grow to RMB27.5 billion in 2029, representing a CAGR of 12.9% from 2024 to 2029. The contribution by wet process plating chemicals to the electronic packaging market in China, which is calculated by the market size of wet process plating chemicals divided by the market size of electronic packaging in term of revenue, is expected to increase from 2.5% in 2024 to 3.0% in 2029.

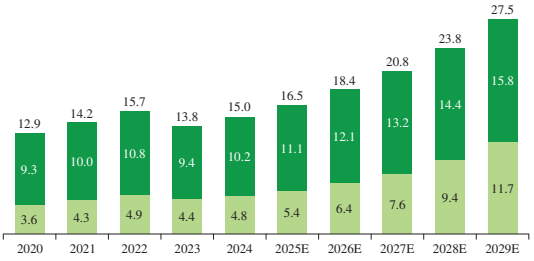
Wet process plating chemicals are primarily applied in semiconductor and PCB industries. From 2020 to 2024, the market for wet process plating chemicals for PCBs grew from RMB9.3 billion to RMB10.2 billion, representing a CAGR of 2.1% in the same period, while the market of wet process plating chemicals for semiconductors increased from RMB3.6 billion to RMB4.8 billion, representing a faster CAGR of 7.6% in the same period. In the next five years, the semiconductor market will become the faster-growing segment, especially driven by the demands from advanced packaging and HPC. The semiconductor segment of wet process plating chemicals market in China is expected to grow to RMB11.7 billion in 2029, with a CAGR of 19.6% from 2024 to 2029. Additionally, the market size of wet process plating chemicals for PCBs is expected to grow to RMB15.8 billion in 2029, with a CAGR of 9.2% from 2024 to 2029.

From 2020 to 2024, the electroless plating market grew from RMB7.3 billion to RMB8.2 billion, representing a CAGR of 3.0%, while the electroplating market increased from RMB5.7 billion to RMB6.8 billion, representing a CAGR of 4.6%. Going forward, the electroless plating and electroplating markets are expected to further increase to RMB13.3 billion and RMB14.2 billion, representing a CAGR of 10.3% and 15.9% from 2024 to 2029, respectively.

Market Size of Wet Process Plating Chemicals Market in China, by Application

RMB Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**3.7%**	**12.9%**
PCB	2.1%	9.2%
Semiconductor	7.6%	19.6%

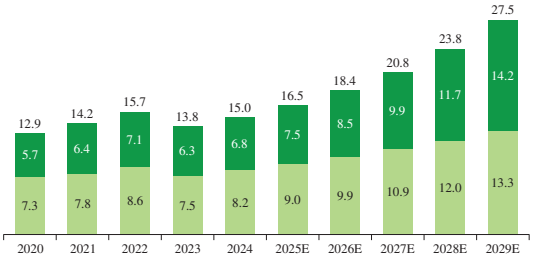


Source: PRISMARK, expert interviews, Frost & Sullivan

Market Size of Wet Process Plating Chemicals in China, by Process Technology

RMB Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**3.7%**	**12.9%**
Electroplating	4.6%	15.9%
Electroless Plating	3.0%	10.3%



Source: Public Information; Frost & Sullivan

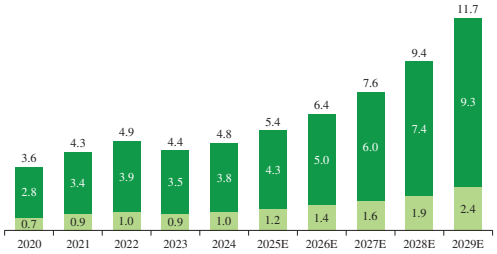
Market Size of Wet Process Plating Chemicals by Application in China

In the semiconductor sector, electroplating technology has significant advantages, including precise control of plating thickness and uniformity, providing high conductivity and low resistivity metal layers, supporting diverse plating chemicals to meet different application needs, and efficient, high-quality production capabilities, making it an indispensable key process in semiconductor manufacturing. From 2020 to 2024, the electroplating market size grew from RMB2.8 billion to RMB3.8 billion, with a CAGR of 7.7%, while the electroless plating market size increased from RMB0.7 billion to RMB1.0 billion, with a CAGR of 7.5%. From 2024 to 2029, the market size of electroplating market is expected to grow significantly from RMB3.8 billion to RMB9.3 billion, with a CAGR of 19.8%, while the market size of electroless plating market is expected to grow from RMB1.0 billion to RMB2.4 billion, with a CAGR of 18.9%.

In the PCB sector, electroless plating represents a major process technology for PCB assembly. From 2020 to 2024, the market size of electroless plating chemicals for PCBs increased from RMB6.5 billion to RMB7.2 billion, and is expected to increase to RMB10.9 billion in 2029, representing a CAGR of 8.8% from 2024 to 2029. Electroplating is mainly used for PTH, via filling, and pattern plating in PCB fabrication. The market size of electroplating chemicals for PCBs increased from RMB2.8 billion to RMB3.0 billion, and is expected to increase to RMB4.8 billion in 2029, representing a CAGR of 10.0% from 2024 to 2029.

Market Size of Wet Process Plating Chemicals for Semiconductor Market in China, by Process Technology
RMB Billion, 2020-2029E

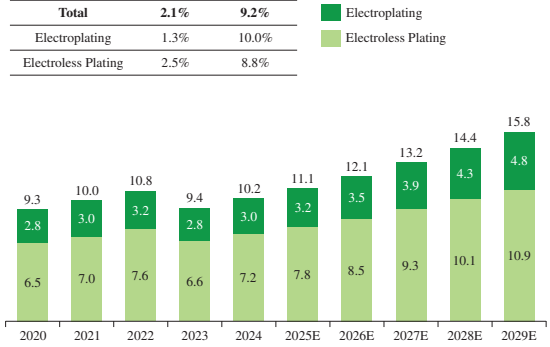
CAGR	2020-2024	2024-2029E
Total	**7.6%**	**19.6%**
Electroplating	7.7%	19.8%
Electroless Plating	7.5%	18.9%



Source: PRISMARK; Public Information; Frost & Sullivan

Market Size of Wet Process Plating Chemicals for PCB Market in China, by Process Technology
RMB Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**2.1%**	**9.2%**
Electroplating	1.3%	10.0%
Electroless Plating	2.5%	8.8%



Source: Public Information; PRISMARK; Frost & Sullivan

Market Drivers of Wet Process Plating Chemicals Market in China

Sustained expansion of semiconductor and PCB industries. From 2020 to 2024, the market size of semiconductor manufacturing market in China grew from RMB256.0 billion to RMB443.7 billion, while the PCB manufacturing market in China increased from RMB275.0 billion to RMB352.4 billion during the same period. As China continues to solidify its position as a global manufacturing hub, the sheer volume of semiconductors and PCBs produced in China is steadily climbing, which in turn drives the increasing overall demands for wet process plating chemicals. On the demand side, the rapid development of emerging fields such as EVs and high-end consumer electronics continues to drive the growth of semiconductor and PCB industries in China. For example, the PCB usage for EVs is approximately 5-8 square meters per vehicle, which is 5-8 times that of ICE (internal combustion engine)-only vehicles. Meanwhile, the number of semiconductors required for ICE-only vehicles is approximately 600 to 700 per vehicle, while for electric vehicles, that number increases to 1,600 per vehicle, and for high-end intelligent vehicles, the number even reaches 3,000 per vehicle. The increasing sales volume of electric vehicles is expected to significantly drive the growth of demands for semiconductors and PCBs.

Strong demands from power semiconductors driven by fast-growing applications. The surge in applications like electric vehicles has increased the need for high-performance power semiconductor devices, such as Si-based IGBT and SiC MOSFET, boosting demand for wafer-level and ceramic substrate-level plating chemicals. Wide band gap power devices, particularly silicon carbide (SiC), are gaining prominence for their exceptional performance under extreme conditions, such as high temperatures and frequencies. These devices have spurred new requirements for plating chemicals, with electroless plating materials becoming essential due to their ability to improve packaging reliability. Consequently, these stricter standards for electrical conductivity, heat resistance, corrosion resistance, precise process control, and environmental adaptability drive the increasing demands for wet process plating chemicals. The expansion of electric vehicles and its electrification and smartization generate

a strong positive pull-on demand for wet process chemicals. As EV penetration increases and semiconductor content per vehicle rises, manufacturers ramp up wafer starts, substrate and PCB capacity, and adoption of more advanced process nodes and packaging technologies. These shifts introduce tighter process tolerances, higher interconnect density, and more complex metallization flows, all of which raise the consumption intensity of plating chemicals. On the other hand, any slowdown in EV production or semiconductor manufacturing transmits quickly upstream. Reduced output at OEMs and IC providers lowers wafer starts and substrate or PCB utilization, immediately decreasing consumption of wet process chemicals. Because these materials are used on a per-wafer or per-panel basis, lower manufacturing activity directly results in reduced demand for core chemistries, additives, and related services. As a result, cyclical downturns in downstream sectors can create short-term demand volatility for wet process chemical suppliers.

Increase in high-performance logic ICs fueled by AI advancements. The rapid development and widespread application of AI technology have significantly increased the demand for high-performance logic ICs. The manufacturing and packaging of these high-performance logic ICs typically rely on multi-chip integration technologies, which heavily depend on advanced packaging techniques to ensure performance, reliability, and miniaturization of logic ICs. As AI applications continue to expand, the need for innovative and efficient logic IC solutions intensifies, further amplifying the reliance on cutting-edge plating chemicals to meet the stringent requirements of modern chip fabrication processes.

Expansion of wafer-level packaging. Moore's Law, predicting exponential transistor growth on integrated circuits, is encountering physical limits, challenging traditional performance scaling. Rising costs of advanced chip manufacturing further drive adoption of advanced packaging technologies, enabling chip and end-product manufacturers to optimize performance and cost-effectiveness. Advanced packaging technologies provide an alternative by enhancing performance, reducing power consumption, and minimizing size without relying on smaller transistors. This trend fuels demand for wet process plating chemicals in wafer-level packaging.

Favorable policies. Favorable policies are a crucial market driver for the wet process plating chemicals market in China, particularly due to their strategic emphasis on strengthening the domestic electronics and semiconductor industries. In particular, in China's "15th Five-Year" New Materials Industry Development Plan, advanced packaging materials, which include wet process plating chemicals, are identified within the category of key strategic materials, with particular reference to advanced packaging materials for Fan-out packaging and 3D IC applications. In addition, electroplating chemicals for advanced packaging are specifically included in the special initiative for breakthrough development of key new materials in priority fields. It indicates that wet process plating chemicals used in advanced packaging are being recognized as strategically important materials supporting high-end chip manufacturing, advanced packaging technology upgrading and broader domestic supply-chain resilience at the national level.

Development Trends of Wet Process Plating Chemicals Market in China

Growing demands for wet process plating chemicals supported by AI-driven semiconductor demand expansion. Benefiting from the rapid expansion of the AI industry, the semiconductor demand has broadened from leading-edge AI accelerators to a wider range of supporting chips used in power management, communication, control and memory, which together form the core infrastructure of AI servers and data centers. Such supporting chips usually adopt mature nodes in manufacturing processes, which are China's manufacturing strength in the semiconductor industry. Against this backdrop, rising semiconductor production and increasingly complex packaging requirements are expected to support demand for wet process plating chemicals, as such materials are essential to metallization and interconnect-related processes, including advanced packaging and other chip manufacturing steps. The tightening supply-demand environment across the semiconductor value chain is also creating more validation and application opportunities for domestic material suppliers in real production scenarios. As engineering experience accumulates and product reliability is progressively verified, domestic players with proven product performance, cost efficiency, supply stability and technical responsiveness are well positioned to gain competitive advantages and capture greater market share. It is expected to favor qualified domestic suppliers and support the continued growth of the wet process plating chemicals market in China.

Increasing demands for high-performance plating chemicals to achieve high-density interconnection. China's booming semiconductor industry is driving demand for high-performance chips and multi-functional chip integration systems. These chips or systems require advanced packaging technologies to achieve compact designs, enhanced processing power, and lower energy use. Techniques such as 3D stacking, WLCSP, and fan-out packaging are critical to improving chip performance. Plating chemicals, essential to the packaging process, directly influence interconnection density, signal transmission speed, and reliability of devices. As packaging technologies advance, the performance demands on plating chemicals intensify, fueling industry trends toward high-density interconnections.

Rise of domestic manufacturers in China. With the continuous domestic investment in R&D and the acceleration of technology breakthroughs, more domestic manufacturers in China are able to provide high-performance, high-quality and reliable plating chemicals which were provided by international manufacturers. These technology advancements provide a solid foundation for domestic manufacturers to enhance their competitiveness and expand their market share. Additionally, the semiconductor and PCB manufacturers in China continue to introduce more domestic material suppliers to upgrade their manufacturing capabilities and secure their supply chain. For example, in the semiconductor sector, the proportion of raw materials supplied by domestic suppliers had increased from approximately 10% to more than 15% in 2024. As a result, it creates a robust and expanding market for Chinese manufacturers of fundamental materials, offering a significant opportunity for growth and innovation within the domestic industry.

Cost Analysis of Wet Process Plating Chemicals Market in China

The production of wet process plating chemicals involves a variety of raw materials, which depend on the specific process used in plating and electronic packaging. As the raw materials of wet process plating chemicals usually comprise of certain elementary substances

such as nickel, palladium, phosphorus, gold, or copper, the prices of raw materials are generally highly related to the prices of relevant elementary substances used to produce such raw materials. The table set forth below demonstrate the major types of raw materials procured by the Group and the corresponding elementary substances and their average price ranges from 2020 to 2025.

Major types of raw materials procured by the Company and corresponding elementary substances and their average price ranges in China (2020-2025)

Types of raw materials	Corresponding elements	Unit	Average price range of elements					
			2020	2021	2022	2023	2024	2025
Nickel(II) sulfate ($NiSO_4$)	Nickel	RMB/KG	115-145	124-177	166-235	135-217	126-143	120-134
Tetraamminepalladium(II) chloride monohydrate ($Cl_2H_{14}N_4OPd$)	Palladium	RMB/G	487-627	480-679	439-568	271-492	238-278	255-398
Palladium(II) sulfate ($PdSO_4$)		RMB/G						
Sodium hypophosphite (NaH_2PO_2)	Phosphorus	RMB/KG	14-15	15-57	28-41	21-31	22-25	22-25
Gold	Gold	RMB/G	328-449	354-405	369-414	409-483	477-635	621-1,011

Between 2020 and 2022, nickel prices exhibited an upward trend, driven by supply disruptions and tightening inventories. Between 2022 and 2025, nickel prices declined due to oversupply from expanded global production, accumulation of inventories, and weaker downstream demand in stainless steel and battery sectors. Palladium prices fell sharply from 2020 to 2024 as automotive demand decreased with the shift to electric vehicles, substitution by platinum in catalytic converters, and speculative selling pressure in futures markets, while the prices surged in 2025, driven by supply chain uncertainties in key producing regions and structural market deficits. Phosphorus prices increased significantly from 2020 to 2021, primarily due to supply constraints under environmental protection policies and strong demand from agriculture and chemical industries. Phosphorus prices declined after reaching elevated levels in 2022, primarily attributable to a moderation in downstream demand and gradual recovery of supply following prior production constraints, with upstream phosphorus ore price fluctuations contributing to overall market volatility. Gold prices maintained an upward trajectory between 2020 and 2025, driven by persistent global inflation, intense geopolitical instability that spiked safe-haven demand, and increasing defensive asset allocation.

COMPETITIVE LANDSCAPE OF WET PROCESS PLATING CHEMICALS MARKET IN CHINA

Ranking and Market Share

Due to high technical barriers, the number of participants which has achieved large-scale commercialization in China's wet process plating chemicals market is relatively limited, resulting in a relatively high concentration of overall market competition. Based on revenue in 2024, the top ten market participants accounted for 63.3% of the market share in China. Market participants in China can be divided into international manufacturers and domestic manufacturers. Thanks to the first-mover advantage in technology research and development

and product layout, international manufacturers have historically dominated the China's wet process plating chemicals market. However, with the rapid technological advancements and continuous introduction of new products by domestic manufacturers, a few domestic companies have gradually gained more market share. Based on revenue in 2024, our company ranks sixth among all participants in the China's wet process plating chemicals market, holding 2.7% market share. At the same time, based on revenue in 2024, our company is also the largest domestic manufacturer in the China's wet process plating chemicals market, and is the largest one-stop plating chemicals and services provider in China. Additionally, in terms of relevant revenue in 2024, our company ranked the third in ENIG/ENEPIG chemicals, the fifth in wafer-level copper electroplating chemicals used for TSV, the third in wafer-level cyanide-free gold electroplating chemicals, and the third in cyanide-free gold electroless plating chemicals for glass substrates among all market players in China, with a market share of 11.8%, 3.3%, 0.3%, and 24.5%, respectively, and our company is also the largest player in terms of relevant revenue among domestic players in such markets. The combined revenue contributed by the above four categories accounted for approximately 75% of our company's total revenue in 2024.

Ranking of Top Ten Players in Wet Process Plating Chemicals Market in China (2024)

Ranking	Players	Type of players	Revenue	Market Share
			(RMB million)	*(%)*
1	Company A	International	2,600	17.4%
2	Company B	International	2,200	14.7%
3	Company C	International	1,400	9.4%
4	Company D	International	1,100	7.4%
5	Company E	International	700	4.7%
6	The Group	Domestic	410	2.7%
7	Company F	Domestic	360	2.4%
8	Company G	Domestic	350	2.3%
9	Company H	Domestic	190	1.3%
10	Company I	Domestic	160	1.1%

Notes:

1. Company A is a subsidiary of a listed company founded in 1961 and headquartered in the United States. It develops process and manufacturing technologies for advanced surface modification, electroless plating and electroplating, and surface finishing.
2. Company B is a private company founded in 1885 and headquartered in Japan. It is specialized in developing and manufacturing precious metal components and materials for industrial use, assets and jewelry.
3. Company C is a listed company founded in 1802 and headquartered in the United States. It is a global leader dedicated to developing advanced materials and technology solutions.
4. Company D is a listed company founded in 1848 and headquartered in Japan. It mainly engages in the research, development, manufacture, and distribution of plating chemicals and surface finishing machineries.
5. Company E is a private company founded in 1922 and headquartered in the United States. It provides advanced surface finishing products and services, including coatings and plating solutions.
6. Company F is a listed company founded in 2010 and headquartered in China. It provides wet chemicals used in applications such as electronic circuits, semiconductor packaging, displays, and new energy.

7. Company G is a listed company founded in 1999 and headquartered in China. It dedicates to providing integrated solutions that combine key process materials for integrated circuits, supporting equipment, application processes, and services.

8. Company H is a listed company founded in 2010 and headquartered in China. It offers electroplating solutions, photoresists, and related chemicals used in integrated circuits, electronic components, and display panels.

9. Company I is a listed company founded in 1980 and headquartered in China. It focuses on businesses of electronic chemicals, chemical reagent, new energy materials, and recycling of retired power batteries.

Source: Public information; expert interviews; Frost & Sullivan

Entry Barriers of Wet Process Plating Chemicals Market in China

Technology barrier. The wet process plating chemicals market is a knowledge-intensive high-tech sector with comprehensive applications across multiple fields. Leading companies in the market have accumulated substantial technical and process know-how, creating significant technical challenges for new entrants. It would take years of efforts for newcomers to overcome these challenges. Existing leading players in the industry have significant technical advantages, forming a strong barrier to entry for new competitors.

Product quality and reliability barrier. Potential customers usually have high standards regarding the product quality and reliability of wet process plating chemicals. Leading companies need long-term accumulated know-how, advanced management abilities and manufacturing technology to build and maintain their product quality and reliability advantages. For new entrants, it would take a long time to raise their product quality and reliability to meet customer requirements. Consequently, the gap in product quality and reliability compared to leading companies presents a significant challenge for new entrants in their early stages.

Validation and qualification barrier. Wet process plating chemical providers must undergo long-term rigorous assessments before entering the supply chain and establishing cooperation relationships with downstream clients. In particular, in the semiconductor sector, which usually has higher requirements on the reliability of plating chemicals, it takes more costs and time for plating chemical providers to develop products and obtain validation and qualifications from semiconductor manufacturers or packaging service providers. Additionally, renowned downstream clients usually have low willingness to replace their existing suppliers due to the long assessment cycles and high switching costs involved. Accordingly, customer qualification and adoption of wet process plating chemicals generally indicate that providers have met the required quality and performance standards.

Talent barrier. Talents with deep technology know-how and extensive practical experience forms a critical barrier in the wet process plating chemicals market. Developing these complex formulations demands cross-discipline talents specialized in chemistry, material science, mechanical engineering. Equally vital are technicians with hands-on experience to implement and optimize plating processes in manufacturing. This includes understanding intricate variables and ensuring quality. Attracting and retaining this specialized expertise is paramount, as it drives innovation and makes it difficult for new entrants to compete.