News Release

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Resonac's Patent on Liquid Encapsulant for AI Semiconductor Packages Upheld

~ A Key Technology Supporting Performance Enhancement of 2.5D Semiconductor Packages with Growing Demand ~

Resonac Corporation (President and CEO: Hidehito Takahashi; hereinafter "Resonac") announces that the Japan Patent Office (hereinafter "JPO") confirmed the validity of its Japanese patent on a liquid encapsulant (Patent No. 7687499) on March 11, 2026, following a third-party opposition regarding the patent's validity. This patent represents a key technology for addressing reliability issues such as stress and crack generation caused by differences in thermal expansion between materials in 2.5D semiconductor packages for generative AI, where demand is expected to grow.

In recent years, with the rapid advancement of generative AI, demand has increased for AI semiconductors capable of high-speed processing of large volumes of data and improved power efficiency. To meet these needs, development of 2.5D semiconductor packaging technology, which enables high-density integration of multiple semiconductor chips, has progressed, and the market is expected to continue expanding.[*1]

In 2.5D semiconductor packages, semiconductor chips and interposer substrates[*2] are connected to package substrates via small bump electrodes, leaving gaps between them. Liquid encapsulants fill these gaps and protect semiconductor packages from the effects of temperature, humidity, and mechanical stress.

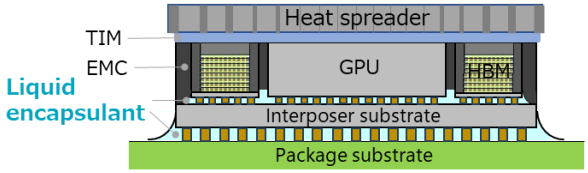
As semiconductor packages continue to advance in performance, individual components such as semiconductor devices, interposer substrates, and printed circuit boards are becoming larger and more complex. As a result, in processes such as reflow soldering[*3] for bump connections

and reliability tests such as temperature cycling, stress caused by differences in the coefficients of thermal expansion and elastic modulus among materials has led to issues such as crack formation in substrates and encapsulant materials.

To address these challenges, Resonac developed a liquid encapsulant in which the coefficients of thermal expansion and elastic modulus are controlled within a specific range by optimizing the resin and additives used. The Company obtained a patent on this invention in May 2025. Subsequently, in November 2025, a third party filed an opposition; however, Resonac submitted arguments to the JPO regarding the novelty and inventive step of the invention. Following examination, the patentability of the invention was recognized, and the decision was made to maintain the patent.

To date, eight oppositions have been filed against Resonac's patents related to liquid encapsulants for AI semiconductors. In all cases, patentability has been recognized and the patents have been maintained. By actively acquiring and utilizing intellectual property related to next-generation semiconductor material technologies, Resonac will secure its technological advantage and contribute to accelerating the development of advanced devices as a leading semiconductor materials company.

*1 Market growth forecast: The 2.5D packaging market is expected to grow at a CAGR of 18.8% from 2025 to 2031 (Source: Fuji Chimera Research Institute, "2026 Electronics Packaging New Materials Handbook," survey conducted from October 2025 to January 2026)
*2 An intermediate substrate used to connect chips with different functions via wiring and mount them onto a package substrate.
*3 A process in which electrode terminals (bumps) are connected by soldering at high temperatures to enable electrical signal transmission.



Cross-sectional view of leading-edge semiconductor package (an example)

Liquid encapsulants

[About Resonac]
Resonac is a functional chemical company established as a result of the integration of Showa Denko and former Hitachi Chemical in January 2023. The Company's sales revenue of semiconductor and electronic materials business for 2025 was about 500 billion yen. The Company is a world-class leader particularly in semiconductor materials for packaging process. The integration of the two companies has enabled Resonac to design functions of materials as well as to develop them in-house, going all the way back to raw materials. The trade name "RESONAC" was created as a combination of two English words, namely, the word "RESONATE" and "C" as the first letter of CHEMISTRY. The Company will make the most of its co-creative platform, and accelerate technological innovation with semiconductor manufacturers, material manufacturers, and equipment manufacturers inside and outside Japan.

For more details, please refer to our website.
https://www.resonac.com/

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