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TANAKA PRECIOUS METALS

PRESS RELEASE

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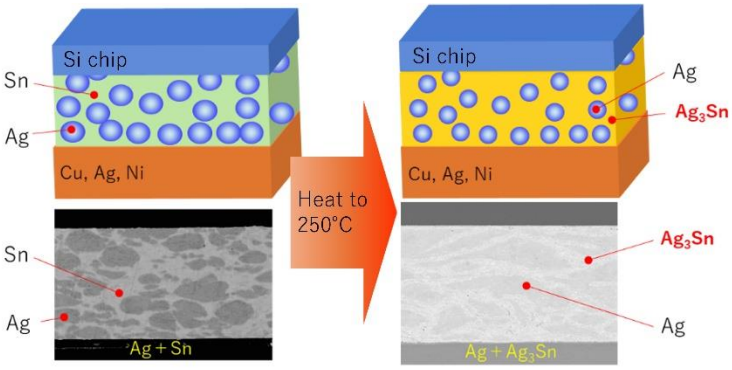
TANAKA PRECIOUS METAL GROUP Co., Ltd.

TANAKA PRECIOUS METAL TECHNOLOGIES Develops AgSn TLP Sheet, a Sheet-type Bonding Material for Power Semiconductors

Compatible with large chip sizes of 20mm, enabling highly reliable bonding over extensive areas and contributes to growing demand for high-current power semiconductors in electric vehicles, hybrid automobiles, industrial infrastructure, etc.

TANAKA PRECIOUS METAL TECHNOLOGIES Co., Ltd. (Head Office: Chuo-ku, Tokyo; Representative Director & CEO: Koichiro Tanaka), which engages in the industrial precious metals business of TANAKA, has announced the development of the **AgSn TLP sheet**, a sheet-type bonding material designed for die attachment in the manufacturing of power semiconductor packages. Additionally, the AgSn TLP sheet is anticipated to serve as an alternative to thermal interface materials[*1] (TIMs) for large-area bonding in heat sinks, further expanding its potential applications.

<AgSn TLP sheets>



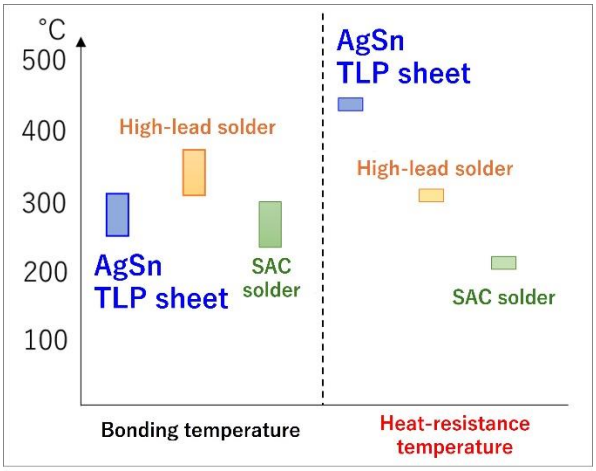
<Bonding concept>

■ Sheet Bonding Material That Allows Bonding of High-Current Large Silicon (Si) Chips

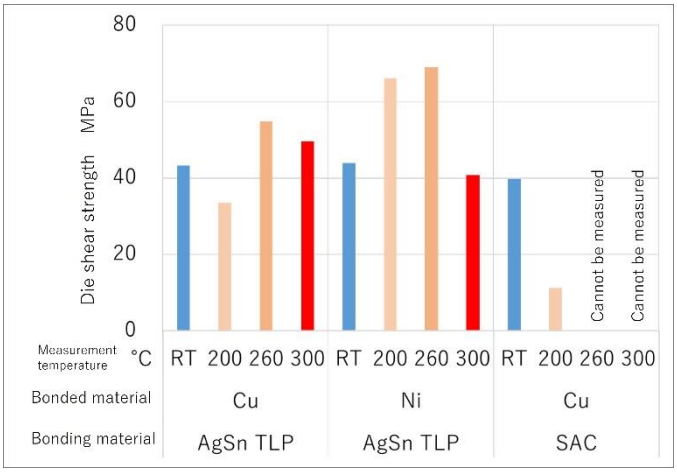
In recent years, there has been rising demand for high-current power semiconductors centered on applications such as electric vehicles, hybrid vehicles, and industrial infrastructure. As such, in the bonding of large Si chips, there are requirements for materials that can allow the bonding of large areas while guaranteeing high reliability. **The AgSn TLP sheet announcement declares that it can be used for semiconductor chip bonding of up to 20 mm. Furthermore, it allows bonding at a low pressure of 3.3 MPa, contributing to the improvement of yield in semiconductor manufacturing**.

■ Low-Temperature Bonding and High Heat Resistance Required for Power Semiconductors to Contribute to Heat Management

Semiconductor devices—including power semiconductors—require high heat resistance as high temperatures may cause failures or shorten lifespans. In addition, the primary bonding materials currently adopted in the manufacturing of power semiconductor packages generally include high-lead solder which is being replaced with other materials due to its impact on the environment[*2], SAC solder[*3] which has low heat resistance, and silver (Ag) sintering agents. **The heating temperature of this product is 250℃, allowing transient liquid phase diffusion bonding[*4]. As the heat-resistance temperature rises to 480℃ after bonding, it has higher heat resistance than existing products. It can also be used with various types of bonded materials, as it can maintain a bonding strength of up to 50 MPa**. Furthermore, this product is a **lead-free bonding material, and it also features high bonding reliability that has passed heat cycle testing of 3,000 cycles**.



<Bonding temperature and heat-resistance temperature>



<Die shear strength>

As large-area bonding is possible, besides application as a die attachment material for power semiconductors, it is **also expected to be used as an alternative to TIMs**. Various materials with high thermal conductivity have been developed for semiconductor package manufacturing, but the low thermal conductivity of TIM materials has been a bottleneck in total thermal design. **This product is a bonding material that allows large-area bonding of TIMs above 50 mm and has high thermal conductivity. It can be expected to contribute toward heat management in the manufacturing of semiconductor packages**.

TANAKA PRECIOUS METAL TECHNOLOGIES is committed to contributing to the development of the semiconductor market, which is expected to expand further going forward. Our dedication to this market ensures that we will continue to innovate and provide solutions that meet the evolving needs of the industry.

[Specifications of AgSn TLP Sheet]

Requirement	Performance
Applicable chip size	Up to 20 mm
Thickness	0.03 to 0.2 mm
Bonding strength (shear strength)	25 to 50 MPa
Heat resistance (high-temperature shear strength at 300℃)	25 to 50 MPa
Reliability (H.C. -50℃ ⇔ 200℃)	3,000 cycles
Bonded materials	Can bond Cu, Ni, and Ag

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*1 A thermal interface material (TIM) is a heat conducting material inserted between materials to dissipate unwanted heat generated in electronic devices.

*2 Although lead is under the scope of regulation by the RoHS Directive, use under a validity period is allowed for applications for which substitutes are not possible scientifically or technically. However, the development of substitutes is underway due to exclusion under the validity period.

*3 SAC solder is a solder material that contains tin (Sn), silver (Ag), and copper (Cu).

*4 Transient liquid phase diffusion bonding, also known as TLP bonding, is a bonding method that temporarily melts and liquifies metals and such inserted in the bonding surface, then uses diffusion to bond through isothermal solidification when carrying out diffusion bonding.

Company Information

■ About TANAKA

Since its foundation in 1885, TANAKA has built a portfolio of products to support a diversified range of business uses focused on precious metals. TANAKA is a leader in Japan regarding the volume of precious metals it handles. Over many years, TANAKA has manufactured and sold precious metal products for industry and provided precious metals in such forms as jewelry and assets. As precious metals specialists, all Group companies in Japan and worldwide collaborate on manufacturing, sales, and technology development to offer a full range of products and services. With 5,355 employees, the group's consolidated net sales for the fiscal year ending December, 2023, was 611.1 billion yen.

■ Official Website：TANAKA PRECIOUS METAL TECHNOLOGIES
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