SMIC Solidifies Authentic, Reliable Product Lineup

The U.S. Securities and Exchange Commission has adopted the implementing rules of the Conflict Minerals provision of Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, also known as the Dodd-Frank Act, a financial regulatory reforms act. This adoption has led to the increase in the number of companies that adopt "conflict-free solder and plating materials" in their corporate values. The so-called conflict-free materials is a new U.S. rule aiming to bar companies from buying tin in the Eastern Region of the Democratic Republic of Congo, which is one of the largest suppliers of tin ore in the African region. The U.S. government claims this move will prevent armed groups in the region to benefit from the sale of tin to legitimate companies.

As part of the new rules Senju Metal Industry Co., Ltd. (SMIC) conducted an audit of all smelters from whom the company imported its tin demand since 2010 and confirmed that the company is not using any tin produced in Congo. Because of this, SMIC said they maintain conflict-free materials and established a system for more transparent information on its supply of tin.

The company, however, acknowledged there has been an increasing cases of fake SMIC products proliferating in the market and have been available for commercial distribution, causing quality issues on original SMIC products and other claims.

Solder powder

Roadmap for Bump Formation

Finer-pitch connections of smaller bumps continue to gather momentum and manufacturers have been targeting to attain finer packaging through the reduction of pitches and three-dimensional (3D) packaging in bump connections, such as in semiconductors. SMIC has introduced a roadmap of the bump formation trend, where the company proposes printing process, which uses solder paste, solder ball process, which uses solder balls, and Precoat by Powder Sheets (PPS) process, which uses PPS transfer solder sheets. The company offers optimal materials in accordance with the pitch size.

BPS Solder Paste for Narrow-Pitch Bump Formation

The solder paste process is a process targeted at the formation of bumps with a pitch of up to about 80μm. This method features high productivity and low cost. BPS is a next-generation solder powder (solder paste) that features high

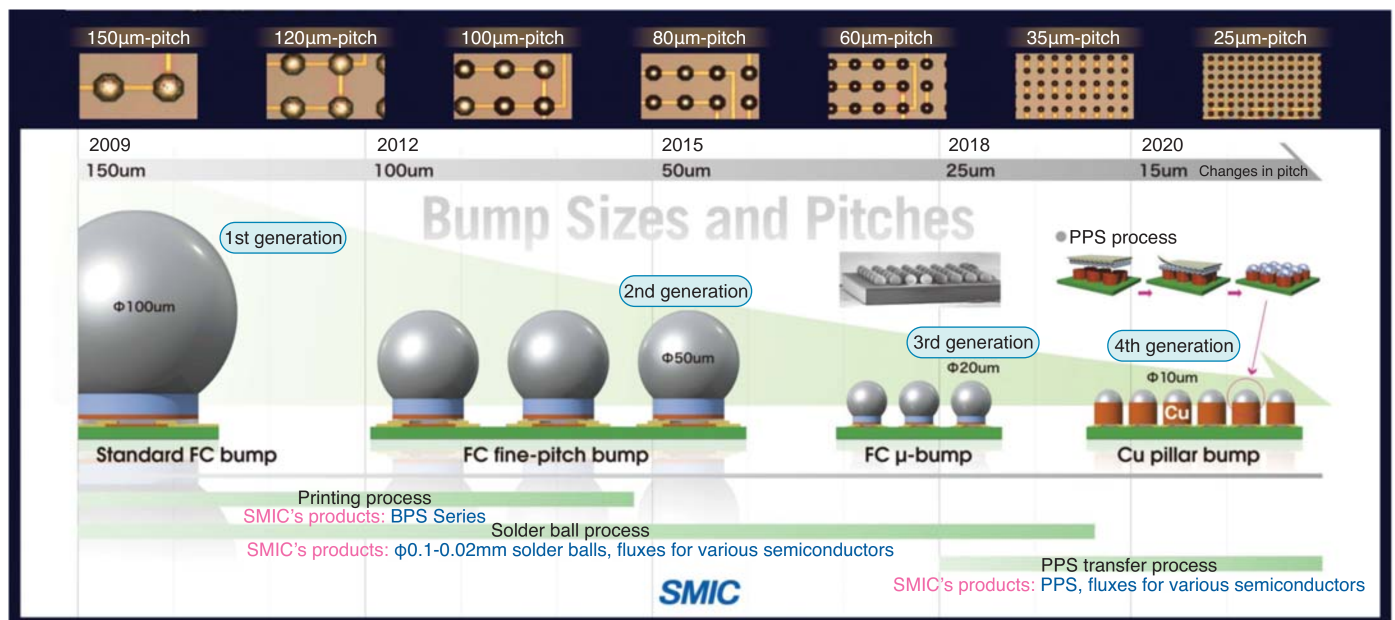

Fig. 1: Trend of bump formation

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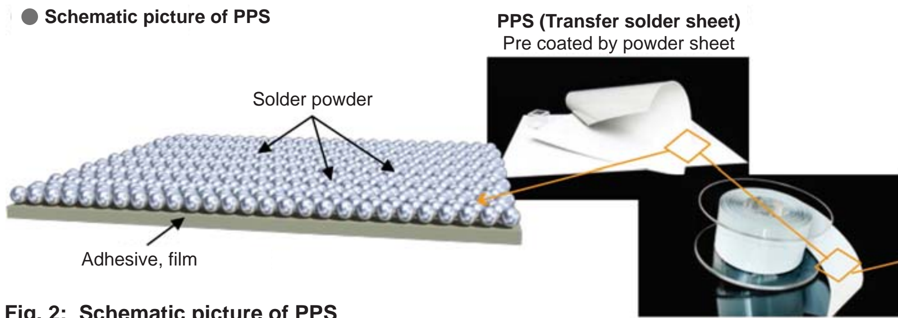

Fig. 2: Schematic picture of PPS

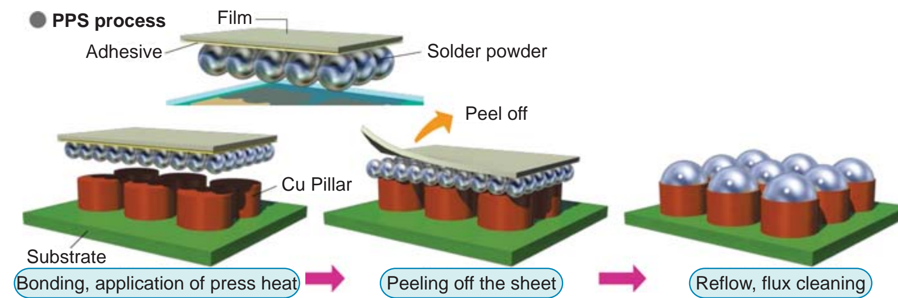

Fig. 3: PPS process

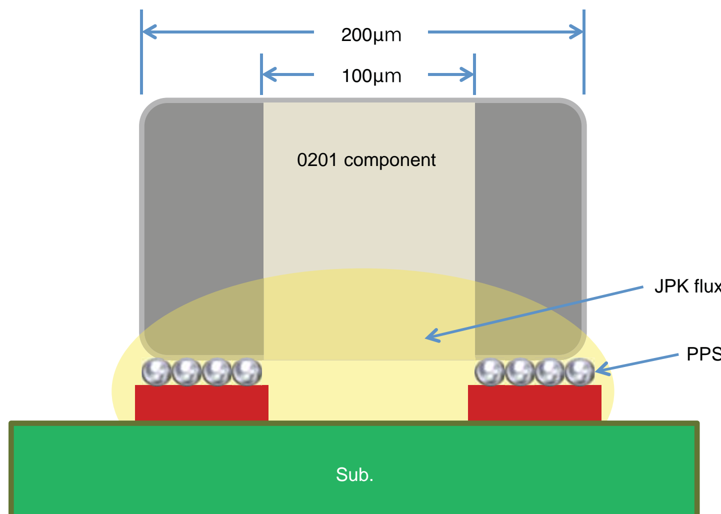

Fig. 4: Mounting of 0201 component by the PPS process

sphericity and narrow tolerance by superior visco-elasticity control technology and the company's original process. It is optimized for narrow-pitch sizes and exhibits stable printing characteristics. It also prevents short-circuiting between bumps due to slumping by heat, and minimizes the development of voids.

Solder Balls with Various Shapes, Diverse Alloys

SMIC targets bump formation of down to the 30μm pitch using balls with a diameter of 0.1 to 0.02mm. The company has achieved narrow-pitch packaging using solder balls, which feature high sphericity, narrow tolerance, low impurities, and low alpha-ray emission, by adding the Shirasu Porous Glass (SPG) process, which uses SPG, to the company's long-established original process. SMIC offers a wide variety of alloys in accordance with purpose and application, including the M770, which has attained both thermal shock resistance and drop impact resistance, which are conflicting properties. M770 attracts attention for adoption in mobile computers.

Mounting of 10μm Bumps with 30μm-Pitch

The PPS process is suitable for achieving packaging with a long-dreamed pitch of 30μm and smaller. The advancement in the reduction of solder ball pitches can lead to short circuiting stemming from the spread of solder in the horizontal direction due to the pressure applied at the time of melting for connection. Bump formation requires a certain amount of solder, where there is a limit to the connection by balls. To overcome the limit, there has been proposals to make as a pillar the copper (Cu) pillar bumps, which adopt Cu and does not melt at soldering temperatures. As they are small, plating films are generally used for bonding. However, reliability is an issue as they are not bonding materials. SMIC has developed PPS, a transfer solder sheet, on which solder powders are deposited, for use on small electrodes, solving this issue by the PPS process. The PPS process is a method of forming bumps by thermally transferring solder powders on minute Cu pillars using PPS, and by applying heat in a reflow furnace after the application of flux.

Bonding of 0201 Components by PPS Process

The PPS process can be applied for the soldering of 0201 components, whose bonding method is expected to pose a challenge, as well. In case of reinforcing mechanical bonding by producing an electrical bonding through thermal transfer of solder on minute narrow-pitch electrodes, the use of joint protect flux, JPK, enables ultra-minute bonding, which is difficult to achieve using pastes, as its flux residue works as an adhesive.

Focus Efforts on Flux Materials, Too

Semiconductor packaging requires flux for solder balls. In the solder ball process, heat is added to solder balls after they are mounted on the substrate to melt and re-solidify them into spherical solders. At this time, flux that prevents deformation of solders, such as depressions, is required. SMIC has developed the MB-T100 Series ultra-high activity flux. Meanwhile, for bonding with wafer, the company has developed 901K5, a flux, which features ultra-low residue and allows the injection of underfill without cleaning.

About This Article:

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