



1990s

Build-up material

~ Discrete Semiconductor/Others ~

In the 1990s, the SiP (System in Package) which integrated several different complete chips such as memory and logic in a single package was developed as an alternative to SoC (System on Chip) which integrated various functional circuits on a single semiconductor chip. It was also called MCM (Multi-chip Module). In 1991, IBM Japan announced the build-up method to form fine pattern wirings on a printed substrate, replacing ceramic multilayer substrate that directly mounted multiple chips. Epoxy-based insulating layers and copper interconnections were sequentially laminated on both sides of a printed wiring substrate

The build-up material that served as the insulating layer was initially made of a liquid varnish coated by screen printing or curtain coater and cured by heat. This method required many processes because the insulating layer was formed on one side at a time. The flatness of the insulating layer was poor due to the unevenness of the copper wiring in the lower layer, making microfabrication difficult. Therefore, the build-up material was made in film form, laminated on both sides, and pressed under high pressure. In this way, the insulating layer surface was made flat

As the wiring pitch of build-up substrate narrowed and the number of wiring layers increased, film materials for build-up required high adhesion to the copper wiring and low dielectric constant. Moreover, lead-free solder had to be used for chip connections to meet RoHS regulations, so that build-up materials required heat resistance of 260-280°C. In 1999, Ajinomoto Fine-Techno introduced a build-up material that met these requirements and was able to achieve planar surface with a low-pressure press (ABF: Ajinomoto Build-up Film). Build-up substrate was made by laminating ABF varnish to a PET core plate and then drying. SiP became a core of rapidly advancing semiconductor technology since the 2000s. The ABF series became the global standard for build-up materials and were widely used.