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## **K&S Licenses Copper Ball Bonding Technology To Advanced Semiconductor Engineering**

Willow Grove, PA (Mar 6th, 2001) - Kulicke & Soffa Industries Inc. (NASDAQ: KLIC) announced that Advanced Semiconductor Engineering Inc. ("ASE" - NYSE: ASX) has signed an agreement to purchase a technology license and specialized equipment for Kulicke & Soffa's proprietary OP<sup>2</sup> SM Oxidation Prevention Process, which is used in the manufacture of copper integrated circuits. ASE will be utilizing the technology, which combines a patent pending process and specialized equipment, to produce advanced copper wafer ball grid array (BGA) packages at its Kaohsiung, Taiwan assembly facility.

According to K&S Director Michael Sheaffer, OP<sup>2</sup> is the first commercially available technology for bonding of gold wire, routinely used in ball bonding processes, directly to a copper device.

"Copper is extremely difficult to wire bond, because of the way it oxidizes," Sheaffer says. "Until now, the only way to achieve reliable results was to add aluminum or other metal layers over the bond pads, increasing wafer fabrication cost by as much as \$100 per wafer. The comparative cost of the OP<sup>2</sup> process is a fraction of that amount. We believe our customers will embrace this alternative as copper continues to replace aluminum in high-performance packages."

"Extensive reliability testing at ASE has shown that OP<sup>2</sup> provides excellent results, and we expect the process to provide significant cost benefits to our customers," said ASE Vice President of Research & Development J.J. Lee. "The process will enable us to combine the performance of copper die with the economics of wire bonding to meet many of our customers' requirements for high-end, fine-pitch packages."

OP<sup>2</sup> adds a cluster tool process in the assembly factory just prior to wafer dicing. This tool removes native oxides from the copper wafer and protects it from further oxide growth during the dicing, die attach, curing, and wire bonding steps of semiconductor assembly interconnect.

This patent-pending OP<sup>2</sup> process has been designed to emulate the mechanisms that are characteristic of traditional gold wire bonding to an aluminum bond pad. Extensive metallurgical analysis has shown that the dynamics of conventional gold-to-aluminum ball bonding are maintained, even though the wafer material is different.

## **About ASE Inc.**

ASE Inc. (NYSE : ASX) is one of the world's largest independent providers of semiconductor packaging services and, together with its subsidiary ASE Test Limited (NASDAQ: ASTSF), is one of the world's largest independent providers of semiconductor testing services, including front-end engineering testing, wafer probing and final testing services. The Company's international customer base includes more than 200 blue-chip companies. With advanced-process technological capabilities and a global presence spanning Taiwan, Korea, Hong Kong, Singapore, Malaysia and the United States, ASE Inc. has established a reputation for reliable, high quality products and services. For more information, visit the website, [www.aseglobal.com](http://www.aseglobal.com)

## **About Kulicke & Soffa**

Kulicke & Soffa is the world's leading supplier of semiconductor interconnect equipment, materials and technologies. Chip and wire solutions combine wafer dicing, die bonding and wire bonding equipment with saw blades, die collets, wire and capillaries. Flip chip solutions include wafer bumping technology, die placement equipment and Ultraviaa high density substrates. Chip scale and wafer level packaging solutions include solder sphere attachment systems and *Ultra* CSP technology. Test interconnect solutions include standard and vertical probe cards, ATE interface assemblies and ATE boards for wafer testing, and test sockets and contactors for all types of packages. The company also markets factory management and shop floor control software. Kulicke & Soffa's web site address is [www.kns.com](http://www.kns.com).

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OP<sup>2</sup> is a service mark of Kulicke & Soffa Industries Inc.