



Applied Materials Leads the Way to Enable TSV Interconnects for 3D Chip Stacking

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- TSVs are a key driver of 3D chip packaging for future mobile communications devices
- Applied introduces latest innovation for TSV production with Producer Avila system
- Applied is first to integrate full portfolio of systems for fabricating TSVs in 3D-ICs

SANTA CLARA, Calif., Jul 12, 2010 (BUSINESS WIRE) --

Applied Materials, Inc. is leading the next technology inflection to advance through-silicon via (TSV) technology for high-volume manufacturing. Seen as a critical technology for producing the world's future mobile devices, TSV structures connect multiple layers of stacked integrated circuits or chips (3D-ICs) to deliver a higher performance, more functional, smaller form factor package that consumes less power. With today's announcement of the [Applied Producer Avila^{\(TM\)}](#) system, Applied Materials becomes the first equipment supplier to offer comprehensive TSV solutions for speeding the development and time to market of 3D-ICs.

According to market researchers, leading chipmakers are making strategic investments in 3D-TSVs, with more than fifteen 300mm pilot lines in operation or under development.¹ Applied's wafer-level equipment market opportunity for advanced packaging, including TSV fabrication, is forecast to be nearly US\$500 million this year.²

"3D chip stacking with TSV interconnects provides the industry with a compelling solution to chip scaling, but successful implementation of TSVs requires an unprecedented level of cooperation within the supply chain," said Dr. Bart Swinnen, director of Interconnect and Packaging at imec. "Applied is a major contributor in our 3D TSV program where we are developing cost-effective technology solutions that will give an extra dimension to scaling."

One of the keys to fabricating many 3D chip structures is the capability to deposit insulating silicon oxide and nitride films at temperatures less than 200°C. The TSVs in these structures are created on exceptionally thin wafers during the final stages of the manufacturing process, where higher temperatures can damage the adhesive used to bond the wafer to its temporary carrier. Uniquely meeting this challenge, the Avila system provides customers with ultra-uniform, low-temperature PECVD³ films at up to three times the wafer throughput of competing technologies, enabling up to a 30% lower cost-of-ownership. A customer has already qualified the Avila system for pilot production of stacked memory devices.

"Our holistic approach allows us to offer customers a complete toolset for all TSV manufacturing flows encompassing etch, CVD, PVD⁴, ECD⁵, wafer cleaning and CMP⁶," said Dr. Randhir Thakur, executive vice president and general manager of Applied's Silicon Systems Group. "With our unique ability to validate complete process flows at the Maydan Technology Center, Applied can accelerate learning for customers and consortium members, assuring a smooth transition from R&D to volume production."

With the launch of the Avila system, Applied now has the only comprehensive portfolio of systems for fabricating TSVs - helping its customers lower the cost and mitigate the risk in adopting this important new technology. Applied will showcase its TSV technology at SEMICON West 2010 in San Francisco. Applied's online home at the show can be found at <http://www.semiwestapplied.com>.

Collaboration with imec

Applied Materials is closely collaborating with imec to develop new TSV-enabling technologies. Within its multi-partner program on 3D integration, imec develops and validates full 3D technologies including the TSV process, wafer backside processes including thinning and backside deposition and patterning, as well as the actual chip stacking and stack packaging operations. A recent breakthrough is the integration of TSV in 65nm CMOS technology. Applied has played a key role in this achievement which has been realized in partnership with more than 20 semiconductor companies.

Applied Materials, Inc. (Nasdaq:AMAT) is the global leader in Nanomanufacturing Technology(TM) solutions with a broad portfolio of innovative equipment, service and software products for the fabrication of semiconductor chips, flat panel displays, solar photovoltaic cells, flexible electronics and energy efficient glass. At Applied Materials, we apply Nanomanufacturing Technology to improve the way people live. Learn more at www.appliedmaterials.com.

¹ "3D IC & TSV Interconnects Business Update," Yole Développement, 2010

² "Semiconductor Back-End Equipment, 2Q10 Update," Gartner Dataquest

³ PECVD = plasma-enhanced chemical vapor deposition

⁴ PVD = physical vapor deposition

⁵*ECD = electrochemical deposition*

⁶*CMP = chemical-mechanical planarization*

Photos/Multimedia Gallery Available: <http://www.businesswire.com/cgi-bin/mmg.cgi?eid=6355412&lang=en>

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Applied Materials, Inc.

Betty Newboe, 408-563-0647 (editorial/media)

Michael Sullivan, 408-986-7977 (financial community)