Synopsys Collaborates with A*STAR IME to Optimize TSI Technology

Synopsys Brings its Expertise in 3D-IC Solutions to Singapore's A*STAR IME-Led 2.5D Through-Silicon Interposer Consortium

MOUNTAIN VIEW, Calif. and SINGAPORE, June 24, 2013 /PRNewswire/ --

- Collaboration will provide the framework for heterogeneous 2.5D/3D-IC systems
- Will optimize silicon interposer technology for lower cost and higher performance

Synopsys, Inc. (Nasdaq: SNPS), a global leader providing software, IP and services used to accelerate innovation in chips and electronic systems, today announced that it will join Singapore's A*STAR Institute of Microelectronics (IME)-led 2.5D TSI Consortium to provide the framework for heterogeneous 3D-IC systems using through-silicon interposer (TSI) technology. Synopsys will contribute its market expertise to the consortium to optimize TSI technology for cost-effective and performance-driven applications. The consortium's research and development efforts will lead to the demonstration of a heterogeneous 2.5D-IC design and manufacturing flow.

The electronic systems market is continually driving the demand for higher performance and functionality at lower cost. While traditional semiconductor technologies utilized in system-on-chip (SoC) devices continue to advance, the limitations in multi-chip systems, including interconnect density and inter-device bandwidth, are constraining system performance improvements. In addition, when multiple semiconductor technologies (such as MEMS, RF, analog and DRAM) are packaged independently from the system processor and related logic functions, it further impacts performance and cost. 3D-IC integration is an emerging solution for heterogeneous, multi-die and package systems. 2.5D-IC, a form of 3D-IC integration, combines silicon interposer, microbump and through-silicon via (TSV) technologies to enable the integration of heterogeneous, multi-die systems in a single package. In comparison to systems that contain the die packaged separately, 2.5D-IC offers many potential benefits, including higher system bandwidth, smaller form factor and faster time to product.

"Collaborating with industry leaders is essential to our 2.5D/3D-IC research and development roadmap," said Professor Dim-Lee Kwong, executive director of IME. "Through the consortium, a valuable resource sharing platform is formed where different fields of expertise and knowledge are readily available to optimize the research efforts and advance the market adoption of 2.5D integration for a wide range of applications."

Synopsys is a market leader in 3D-IC solutions. Examples of the 3D-IC solutions offered by Synopsys include Synopsys' Galaxy Implementation Platform and TCAD Sentaurus simulation software.

Synopsys' Galaxy platform features support the implementation and analysis of 2.5/3D-IC designs, including:

Physical Implementation

- IC Compiler™ multi-die physical implementation with support for placement, assignment and routing of microbumps and TSVs; inter-die alignment checks; redistribution layer (RDL) and signal routing, and power mesh creation on silicon interposer interconnection layers

Analysis and Signoff

- IC Validator design rule checking (DRC) and layout vs. schematic (LVS) connectivity checking between stacked die and silicon interposer
- StarRC™ Ultra parasitic extraction support for TSV, microbump, RDL and signal routing metal for TSI interconnection
- PrimeTime® static timing analysis of multi-die systems

Test

- DFTMAX™ compression for die-level design-for-test and multi-die test access infrastructure
- TetraMAX® ATPG for testing each die and test interconnection between dice on the silicon interposer

Synopsys' TCAD Sentaurus Interconnect supports the integration and optimization of 3D-IC fabrication and packaging by simulating TSV and microbump mechanical stress with its impact on the electrical performance of neighboring transistors and the reliability of the 3D-IC stack.

"2.5D- and 3D-IC integration technologies are extending the lifespan of established semiconductor processes," said John

Chilton, senior vice president of marketing and strategic development at Synopsys. "They offer many potential benefits, including higher performance and lower power in a cost-effective system-level solution. IME's commitment to drive the realization of 3D-IC benefits and their deep research and development capabilities make them a great partner for Synopsys. We expect our joint collaboration as part of the TSI Consortium will enable designers to quickly create innovative heterogeneous multi-die systems using TSI technology."

For more information on the Synopsys 3D-IC solution, please visit:www.synopsys.com/3D-IC.

About A*STAR Institute of Microelectronics

The Institute of Microelectronics (IME) is a research institute of the Science and Engineering Research Council of the Agency for Science, Technology and Research (A*STAR). Positioned to bridge the R&D activities between academia and industry, IME's mission is to add value to Singapore's semiconductor industry by developing strategic competencies, innovative technologies and intellectual property; enabling enterprises to be technologically competitive; and cultivating a technology talent pool to inject new knowledge into the industry. Its key research areas are in integrated circuit design, advanced packaging, bioelectronics and medical devices, MEMS, nanoelectronics, and photonics. For more information about IME, please visit http://www.ime.a-star.edu.sg.

About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is the lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore. A*STAR oversees 14 biomedical sciences, physical sciences and engineering research institutes, and seven consortia and centres, which are located in Singapore's Biopolis and Fusionopolis biomedical and engineering research hubs, as well as their immediate vicinity. A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in universities, hospitals, research centres, and with other local and international partners. For more information about A*STAR, please visit http://www.a-star.edu.sg.

About Synopsys

Synopsys, Inc. (Nasdaq: SNPS) accelerates innovation in the global electronics market. As a leader in electronic design automation (EDA) and semiconductor IP, its software, IP and services help engineers address their design, verification, system and manufacturing challenges. Since 1986, engineers around the world have been using Synopsys technology to design and create billions of chips and systems. Learn more at https://www.synopsys.com.

Forward-Looking Statements

This press release contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, including statements regarding the expected outcome and benefits of the joint collaboration between Synopsys and IME and the TSI Consortium. These statements are based on current expectations and beliefs. Actual results could differ materially from those described by these statements due to risks and uncertainties including, but not limited to, technical or other difficulties in developing solutions, unforeseen production or delivery delays, failure to perform as expected, product errors or defects and other risks as identified in Synopsys' filings with the Securities and Exchange Commission, including those described in the "Risk Factors" section of Synopsys' latest Annual Report on Form 10-K.

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