

# SEMATECH and Synopsys to Develop Advanced OPC Models for 45-Nanometer and Below Immersion Lithography

Accurate OPC Modeling Critical for Accelerating Time to Yield

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AUSTIN, Texas and MOUNTAIN VIEW, Calif.

Synopsys, Inc. (NASDAQ: SNPS), a world leader in semiconductor design software, and SEMATECH, the leading semiconductor consortium, today announced a joint program to develop advanced optical proximity correction (OPC) models that will enable the extension of optical lithography.

A key goal of the program, part of SEMATECH's 193 nanometer (nm) Immersion Lithography Extendibility Project, is to facilitate better understanding of the challenges in process nodes beyond 45 nanometers (nm) so that participants can develop software and manufacturing processes that will meet these challenges. The program leverages Synopsys' industry-leading Proteus mask synthesis software.

The program's preliminary modeling results have been strong, indicating that immersion tools using a 1.3 numerical aperture (NA) can be image-corrected for use at the 45-nm half-pitch. The objective is to eventually enable the extension of immersion lithography to the 32 nm half-pitch, and extend models for optical tools with numerical aperture (NA) 1.55 and greater.

"Since advanced immersion tools are just now being developed, modeling is critical to determining how far we can go with immersion lithography. The Synopsys tools have proven useful in developing the OPC models that will allow us to push the immersion frontier," said Shane Palmer, SEMATECH senior technologist and Texas Instruments assignee. "SEMATECH's project is geared toward preparing tools for the next generation of immersion scanner that will use higher index fluids, NA above 1.3 and full polarization control. The results will help SEMATECH member companies make informed decisions about appropriate imaging tools for advanced technology cycles."

In immersion lithography systems, the immersion liquid (such as pure water) is placed between an exposure tool's projection lens and a wafer, and the liquid's refractive properties are used to create higher resolution images than a "dry" lens system will allow. Immersion also allows a lens to be designed with an NA greater than 1 which permits even further resolution improvement. Accurate modeling of the optical distortions introduced by these "hyper-NA" projection systems is required in order to validate designs, perform OPC, and add reticle enhancement technologies (RET) that enable high yield in manufacturing.

Synopsys' Proteus software facilitates high-speed accurate modeling by enabling engineers to simulate electromagnetic diffraction and scattering through the photomask. The software also provides the flexibility for engineers to progress through the various modeling steps required for immersion lithography. The resulting silicon image helps process development engineers better understand the predictability and yield of their processes.

"Together, Synopsys and SEMATECH are addressing the escalating need for accurate, high-speed OPC modeling at the 45 nanometer node," said Anantha Sethuraman, vice president of DFM Solutions at Synopsys, Inc. "We expect this will be one of a number of collaborations in which Synopsys will link its comprehensive DFM software solution to technology-leading researchers like SEMATECH, to advance complex technology issues such as immersion lithography and help our customers achieve their production and yield goals at process nodes beyond 45 nanometers."

## About Synopsys DFM

Synopsys offers the industry's most comprehensive design for manufacturing (DFM) solution that spans from RTL to mask. Its DFM product family addresses critical manufacturability and yield issues with its Hercules™ physical verification, Proteus mask synthesis, CATS® mask data preparation, SiVL® lithography verification, i-Virtual Stepper™ mask defect dispositioning, patented PSM technology, and physics-based TCAD suite of simulation products. Synopsys takes a systematic approach to design for manufacturing that makes intelligent use of design and manufacturing data throughout its entire flow to help ensure that designs at 65 nanometers (nm) and smaller geometries will achieve desired yield goals.

## About SEMATECH

SEMATECH is the world's catalyst for accelerating the commercialization of technology innovations into

manufacturing solutions. By setting global direction, creating opportunities for flexible collaboration, and conducting strategic R&D, SEMATECH delivers significant leverage to our semiconductor and emerging technology partners. In short, we are accelerating the next technology revolution. For more information, please visit our website at [www.SEMATECH.org](http://www.SEMATECH.org). SEMATECH, the SEMATECH logo, AMRC, Advanced Materials Research Center, ATDF, the ATDF logo, Advanced Technology Development Facility, ISMI and International SEMATECH Manufacturing Initiative are servicemarks of SEMATECH, Inc.

## About Synopsys

Synopsys, Inc. is a world leader in electronic design automation (EDA) software for semiconductor design. The company delivers technology-leading semiconductor design and verification platforms and IC manufacturing software products to the global electronics market, enabling the development and production of complex systems-on-chips (SoCs). Synopsys also provides intellectual property and design services to simplify the design process and accelerate time-to-market for its customers. Synopsys is headquartered in Mountain View, California and has offices in more than 60 locations throughout North America, Europe, Japan and Asia. Visit Synopsys online at <http://www.synopsys.com/>.

## Forward Looking Statements

This press release contains forward-looking statements within the meaning of the safe harbor provisions of Section 21E of the Securities Exchange Act of 1934, including statements regarding the expected benefits of the joint program to develop advanced optical proximity correction (OPC) models. These statements are based on Synopsys' and SEMATECH'S current expectations and beliefs. The actual results of the program could differ materially from those implied by these statements as a result of unforeseen difficulties in completing development of the models, uncertainties attendant to any new joint technology development project and certain statements contained in the section of Synopsys' Quarterly Report on Form 10-Q for the fiscal quarter ended July 31, 2005 entitled "Factors That May Affect Future Results."

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