

# **Innovative scatterometry approach for self-aligned quadruple patterning (SAQP) process control**

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Nano-electronics research center Imec and Nova Measuring Instruments, a leading innovator and key provider of metrology solutions for advanced process control used in semiconductor manufacturing, announced today at SPIE advanced lithography conference that they are jointly developing an innovative scatterometry approach to enable SAQP process control. The initial results will be presented during the conference.

As 193nm [immersion lithography](#) is reaching its optical resolution limit using single exposure, advanced multipatterning concepts are studied to reach lower nodes. Targeting the N7 node, self-aligned quadruple patterning (SAQP) is an advanced patterning approach that uses pitch splitting to extend the capability of double patterning (SDP) 193nm immersion lithography. Nova and imec jointly developed an approach based on scatterometry technology to determine the main contributors to the CD (critical dimension) variation between different populations of lines and spaces. Using parallel interpretation of multiple scatterometry targets with slightly variable pitches, the researchers revealed that scatterometry is capable of measuring different space populations, and the developed metrology solutions can be utilized to monitor and control each process step of SAQP patterning.

"Collaborating with Nova has enabled us to develop a method to improve process control in SAQP for the most advanced nodes," said An Steegen,

senior vice president process technology at imec. "Such collaboration is helping the entire semiconductor industry to lower risks and shorten the time to market for the next generation technologies by delivering innovative metrology solutions for the key process control challenges ahead."

"We are excited with the opportunity to collaborate with imec, join its Affiliation Program, and demonstrate the value of our optical CD for early R&D stages," said Dr. Shay Wolfling, Nova's CTO. "We believe that the growing process challenges arising from the advance technology nodes require close partnership between research centers, customers and vendors, and this is part of Nova's stated long-term strategy. Such collaboration with imec , early in the development cycle, allows us to align our technology roadmap accordingly and contribute to our customers' success."

Provided by IMEC

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