High-NA EUV: Getting Closer to Industry Introduction (Keynote)

Jan van Schoot

ASML Netherlands B.V. (The Netherlands)
De Run 6501, 5504 DR Veldhoven, The Netherlands

At this moment EUV systems equipped with a 0.33 Numerical Aperture (NA) have proven themselves and are successfully applied in high volume manufacturing. At the same time, ASML and ZEISS are in parallel ramping up their activities considerably on an EUV exposure tool with an NA of 0.55. The purpose of this so-called high-NA scanner, targeting an ultimate resolution of 8nm, is to extend Moore’s law for at least another decade. A novel lens design, capable of providing the required Numerical Aperture, has been identified; this so called anamorphic lens will provide 8nm resolution in all orientations. Paired with new, faster stages and more accurate sensors providing the tight focus and overlay control needed it enables future nodes.

In this paper, a short overview of the current state of the 0.33NA technology will be given, after that the advantages of High-NA will be outlined. Next to this, an update will be given on the status of the developments at ZEISS and ASML. Mirror manufacturing is in full swing, and the first mirrors that have reached their final specification are produced. Integration of the main modules at ASML is ongoing. At the same time the planned Imec-ASML joint lab is being readied to receive the first complete High-NA system. In this lab, customers can start working on High-NA, while the subsequent tools are manufactured and shipped.

Presenting Author

Jan B.P. van Schoot, PhD, is Director of System Engineering and Technical Specialist at ASML, based in Veldhoven, The Netherlands. After his study Electrical Engineering (Cum Laude) at Twente University of Technology. He received his PhD in Physics on the subject of non-linear optical waveguide devices in 1994 and held a post-doc position studying waveguide based electro-optical modulators. He joined ASML in 1996 and was Project Leader for the Application of the first 5500/500 scanner and its successors up to 5500/750. In 2001 he became Product Development Manager of Imaging Products (DoseMapper, Customized Illumination). In 2007 he joined the dept of System Engineering. He was responsible for the Optical Columns of the 0.25NA and 0.33NA EUV systems. After this he worked on the design of the EUV source. He was the study leader of the High-NA EUV system and is now responsible for the HighNA optical train. He is a Sr. Member of the SPIE, holds over 35 patents and presents frequently at conferences about photolithography.

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