Creative Metrology Development for EUVL: Flare and Out-of-Band Qualification

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Extreme Ultraviolet Lithography (EUVL) is the leading candidate for 22nm half-pitch device manufacturing and beyond. These geometries impose not only tighter requirements in terms of standard CD metrology, but also the need for new and creative metrology approaches to quantify and monitor EUV-specific parameters. In this paper, we will discuss our approaches to the estimate of two key EUV imaging parameters: flare and out-of-band radiation (OoB).

EUV sources are known to emit a broad spectrum of wavelengths ranging from EUV to DUV and beyond. As the DUV contribution reaching the wafer could affect imaging performance, it is critical to determine the amount of DUV OoB at wafer level in EUVL tools. With this aim, we have developed a methodology to measure the EUV/DUV ratio at wafer level, based on an aluminum coated mask fully qualified in EUV as well as in DUV. The experimental OoB results for two EUVL tools (the ASML ADT and NXE:3100) are discussed and compared with modeling predictions.

The critical role of flare in EUVL is well known. Nevertheless, the flare level estimate has been historically based on operator and tool-dependent procedures, unable to meet the basic requirements for accuracy and precision. We developed a robust in-line approach to flare metrology, qualified both in terms of precision and accuracy. Also in this case, we report experimental results for two EUVL tools (the ASML ADT and NXE:3100). The experimental data are compared to full-chip simulations using the original point spread function (PSF).