

Study on the Dose Performance of EUV Lithography Scanner Using Novel In-wafer Dose Measurement

Jinseok Heo, Insung Kim, Sungsoe Kim
Semiconductor R&D Center, Samsung Electronics
1, Samsungjeonja-ro, Hwaseong-si, Gyeonggi-do, Republic of Korea
jin.seok.heo@samsung.com

In this paper, the dose performance of high-end EUV scanner (ASML NXE 3300) will be analyzed using the novel in-wafer exposure energy measurement. This method was developed based on the simple phenomena which the reflective light can be different by the thickness change of photoresist on the wafer. The macro inspection image is used to detect the reflective light from the wafer level. As the practical dose on the wafer can be measured by this method, it should be very significant technology for monitoring the dose performance of EUV scanner system.

The detailed experimental analysis of dose performance in the EUV scanner will be discussed in this paper. The basic characteristics of dose performance from high-end EUV scanner, namely slit-uniformity, scan-uniformity and etc., will be compared with those from the immersion ArF scanners. The EUV dose stability reflecting the EUV plasma stability will be also covered. In addition, the analysis on the field edge effect by deep ultraviolet (DUV) out of band (OoB) reflected from the black border of the EUV reticle will be analyzed to understand how much area will be affected in a wafer and how much CD impact will be occurred by this DUV OoB flood exposure in the EUV scanner.

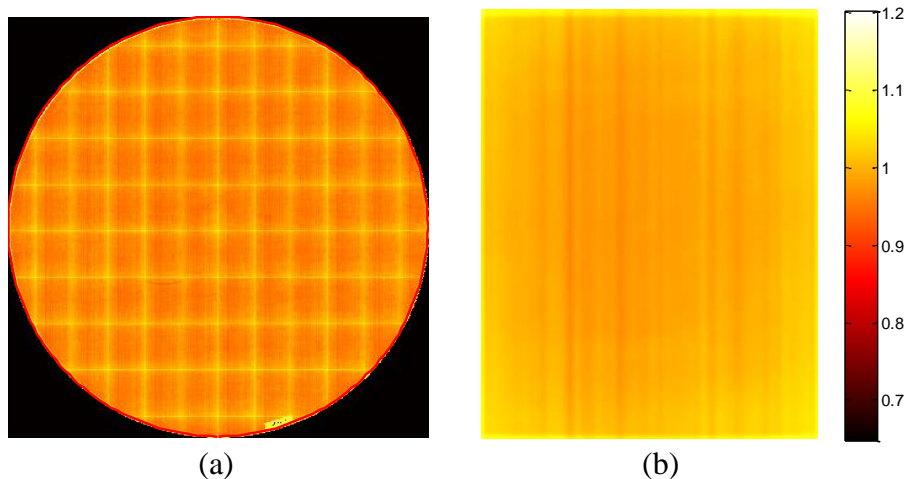


Figure 1: Normalized Dose Uniformity Map Using the Novel Dose Measurement: (a) In-wafer dose uniformity and (b) In-field dose uniformity map. This map reflects the dose performance of EUV scanner (ASML NXE 3300).