

NEW ELECTRON-BEAM BASED PHOTOMASK REPAIR TOOL

Peter Kuschnerus, Johannes Bihl, Heinz Honold (LEO GmbH, 73447 Oberkochen, Germany)

Klaus Edinger, Volker Boegli, (NaWoTec GmbH, 64380 Rossdorf, Germany)

High-resolution electron-beam induced deposition and etching is an enabling technology for current and next generation photomask repair. Based on this technology, NaWoTec and LEO Electron Microscopy have jointly developed a mask repair tool, which is capable to meet the 65 nm lithography node requirements, and extendible to 45 nm and below. Repair processes are available for a wide variety of mask types, such as quartz binary masks, phase shift masks, EUV masks, and e-beam projection stencil masks. The tool combines LEO's ultra-high resolution Supra SEM platform with NaWoTec's proprietary e-beam deposition and etching technology.

In this presentation, we focus on performance results, especially the accuracy and reproducibility of repair of clear and opaque programmed defects on Cr, TaN, and MoSi quartz masks, as well as on SiC and Si stencil masks. We also present our progress on charge compensation, which is essential to meet placement specifications on nonconductive masks.

In October 2003 a beta tool had been shipped to the first customer, then developments had been done towards a production tool with enhanced performance and automation. The product is launched to the semiconductor market on the occasion of SEMICON Europe in April