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PERFORMANCE VALIDATION OF MAPPER'S FLX-1200

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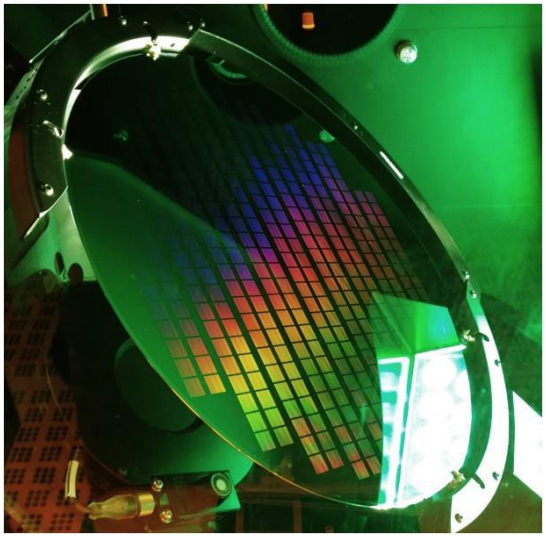
The launch of massively parallel mask less lithography is, without any doubt, an attractive solution for the semiconductor industry and opens new opportunity for the manufacturing of innovative chips. In partnership with MAPPER Lithography BV, CEA-Leti team assesses the progress of this technology and builds the full ecosystem required for its start-up in industry world.

Now Mapper production platform is on the path to industrial ramp-up. Mapper has installed its first operational product, the FLX–1200, at CEA-Leti in Grenoble (France). This is a maskless lithography system, based on massively parallel electron-beam writing with high-speed optical data transport for switching the electron beams. The FLX-1200, containing 65,000 parallel electron beams, has a 1 wph throughput at 300 mm wafers and is capable of patterning any resolution and any different type of structure all the way down to 28 nm node patterns. The system has an optical alignment system enabling mix-and-match with optical 193 nm immersion systems[1] using standard NVSM marks. The installation of this platform with the silicon Leti pilot line aims to develop quickly the process turnkey solution for specific applications : hardware encoded single chips for IoT market, low volume manufacturing, mastering.

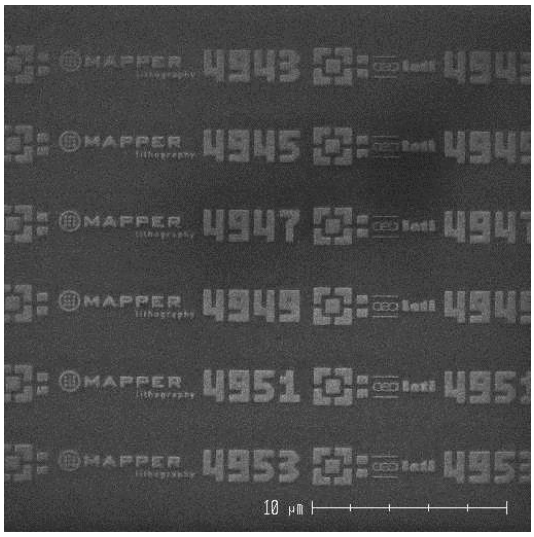
This talk will be focused on the presentation of the latest technical achievements of the FLX-1200. The main development item of this system has been the lifetime of blanker module that is the module that drives individually all the 65,000 beams. As of August 2017 the FLX-1200 has a fully operational electron optics column, including a 65,000 beam blanker. In August the first full wafer was exposed with this blanker, as shown in Figure 1. At the conference, we will report on endurance runs in full tool configuration and report on monitoring data regarding imaging. This talk will report as well on the latest overlay performances using standard image based overlay metrology as shown in Figure 2.

With the installation of its active blanker module, the Mapper production platform is now on its path to industrial ramp-up. This talk will also report on lithography demonstration examples of real devices printed on the FLX-1200 at Leti site

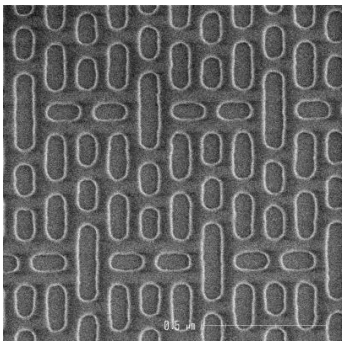
[1] N. Vergeer et al. "MAPPER Alignment sensor evaluation on Process Wafers", Proc. SPIE 8680, Alternative Lithographic Technologies V, 86801E



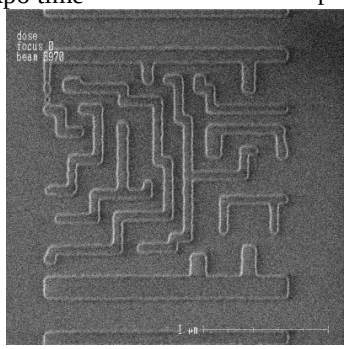
a 300mm wafer in 52min expo time



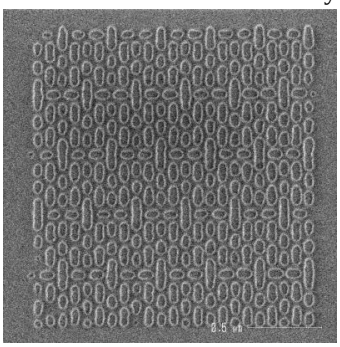
Beams operational and switch on/off individually



60 nm HP (N40)

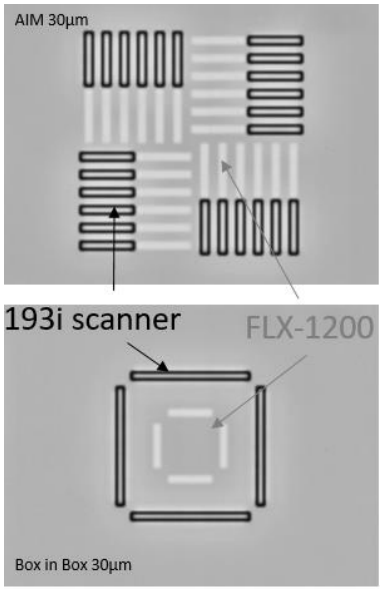


28nm Logic design



40 nm HP (sub N28)

Figure 1, First imaging results from the FLX-1200 at CEA-Leti with fully operational column and active blanker. All beam are driven individually



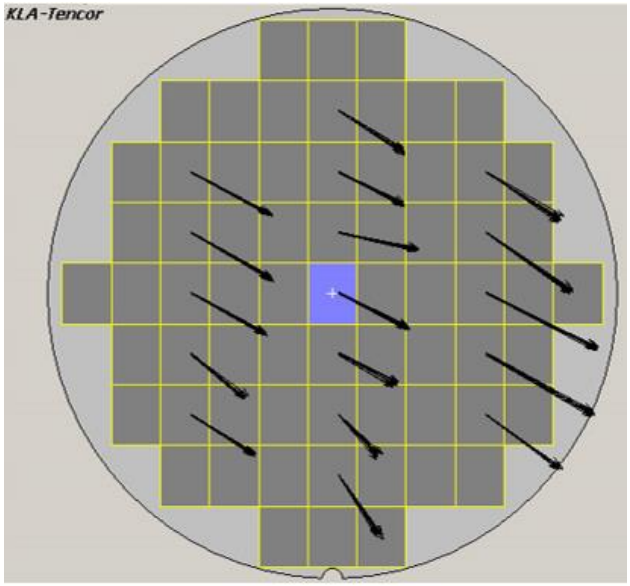


Figure 2, First overlay results from the FLX-1200 at CEA-Leti with respect to 193nm scanner and using standard image base overlay metrology.