The European "MAGIC" initiative on massively parallel electron beam lithography
Resist technology status

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In the International Technology Roadmap for semiconductors (ITRS) [(1)], Mask Less Lithography (ML2) is identified as a back-up solution for sub 45nm half pitch technologies. Nevertheless, with the dominant position of the "photon for ever" solution, it never succeeded to be identified up to now as a clear option for manufacturing. But this situation starts to change with the continuous cost progression of the optical lithography processes induced by the complexity of optical proximity correction, the trends of scanner and mask prices… And the optical golden road does not seem able to stop this cost evolution with the coming options like EUV and double patterning.

With these perspectives, a mask less solution represents a promising option to deal with these concerns for the sub32nm half pitch semiconductor technologies, as recently promoted in several papers[(2)]. The interest is not only focused on production price of prototypes[(3)], but also for the patterning solution of the contact layers for the coming generations.

However, ML2 is still today developed at start-up company level without clear industrial forecasts. Though interest from semiconductor end users[(3)] is increasing, more industry support is required to ensure its take off. In Europe, a new project, called "MAGIC" (Mask less lithography for IC manufacturing), started January 1st 2008 in the European Union's 7th work framework program with 12 partners[(*)]. Its goal is to strengthen the development of the ML2 technology. The target is to deliver in 2009 a first alpha platform compatible for the 32nm half pitch design rules with its complete infrastructure (resist process, data preparation and full package of proximity correction solutions). An overview of this program will be given in this paper. It will show the importance of this European federative initiative for the promotion of the ML2 technology. Such an international collaboration is vital for the future of this technology to live up to its technological and economical promise. A special highlight will be given on process development and a status of resist process capability versus the different tool options will be presented.

(*) MAGIC partners :CEA-LETI, MAPPER, IMS Nanofabrication, IMS chips, Delong Instruments, Fraunhofer institutes, Synopsys, STMicroelectronics, Qimonda, Vorarlberg University, Fujifilm and KLA Tencor

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