Operation and performance the CNSE Vistec VB300 electron beam lithography system

J. G. Hartley, T. R. Groves
College of Nanoscale Science and Engineering
State University of New York at Albany
255 Fuller Rd, Albany NY 12203
A. McClelland, N. Crosland, P. Barlow, J. Cunanan, K. Han, E. Fitzgerald
Vistec Lithography Inc. 125 Monroe St. Watervliet, NY 12189

At the end of 2008, the College of Nanoscale Science and Engineering (CNSE) formally accepted a Vistec VB300 Gaussian electron beam lithography system. The system is a key component of the overall lithography strategy of the College and complements existing state of the art tooling for 193nm immersion, Extreme Ultra Violet and nanoimprint. The demonstrated resolving power of the system (Fig. 1) easily exceeds that of the facilities scanners. Together with 300mm wafer compatibility (Fig. 2), and a class 1 mini environment, the system is well poised to execute its primary mission of supporting a variety of programs in post CMOS device integration. For a 300mm tool to be able to exchange wafers with other tooling in a full flow line it is necessary to pass stringent backside metal contamination testing. TXRF (total reflection x-ray fluorescence) testing performed with 300mm wafers on the VB300 satisfied the permitted metal contamination levels and cleared the way for introduction of ebeam patterned wafers into the process flow. Most of the tooling in the 300mm line handles wafers in front opening universal pods (FOUPS). With the relatively low throughput of the system (hours per wafer, not wafers per hour), this type of interface is not required. In order to maintain a low level of defects, 300mm wafers are removed from the FOUPS in the class 1 mini environment and loaded into the system.

In addition to the 300mm capability, they system supports a wide range of wafer sizes, photomasks and piece parts. This enables the platform to support the 200mm activities at the College as well as the small samples frequently encountered with novel materials that have no support tooling available for 200mm and 300mm wafer sizes.

The VB300 platform readily met the Vistec standard acceptance test specifications, an example of which is shown in Fig. 3. The paper will present further details of the acceptance test together with examples of the integrated lithography performed in the CNSE 300mm cleanroom.

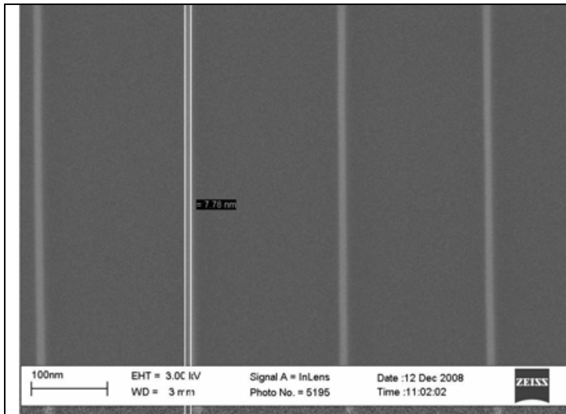

Fig 1: 8nm lines: Printed in HSQ with 100KV beam

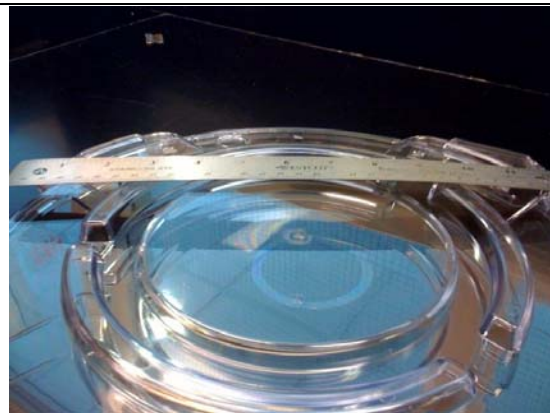

Fig 2: 300mm exposure: 1st 300mm wafer exposed on the CNSE Vistec VB300

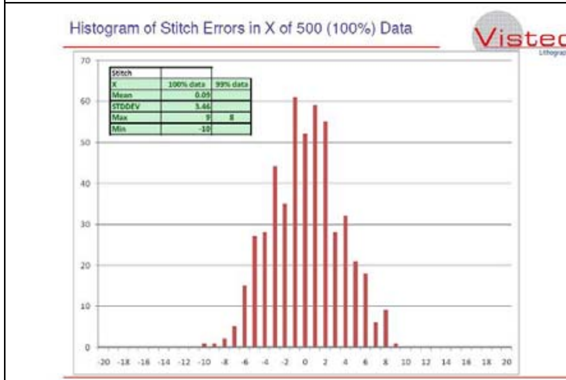

Fig 3a: X stitch errors: Data from 100KV acceptance testing

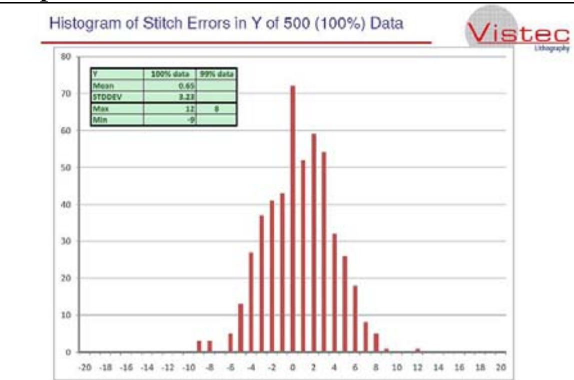

Fig 3b: Y stitch errors: