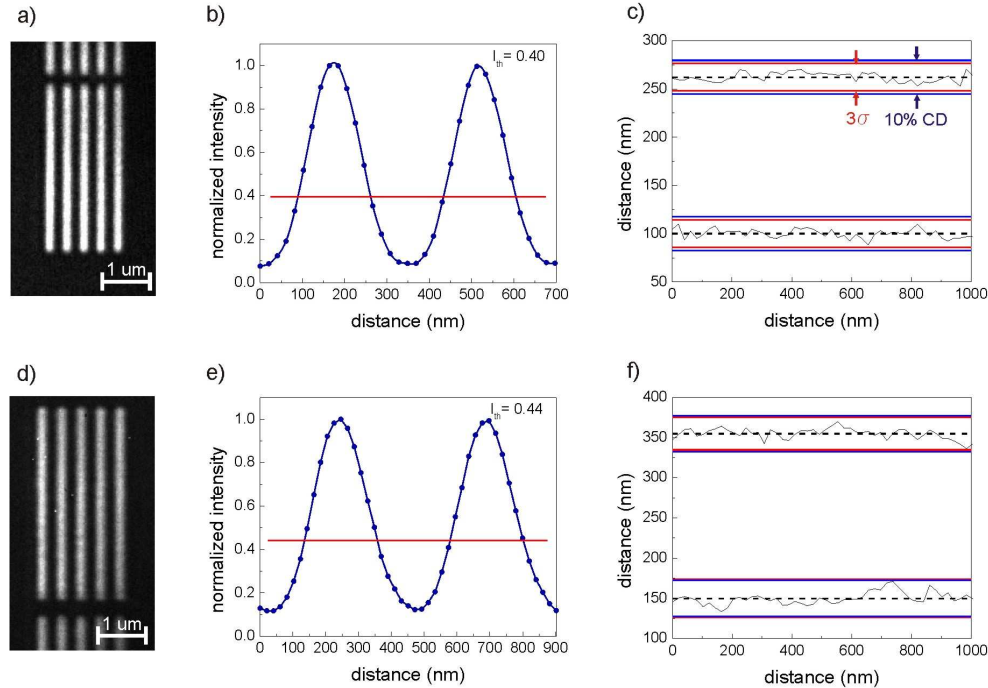

Fig. 5. LER analysis of a) 175 nm and d) 225 nm half-pitch gratings. Normalized intensity versus position plots are given in b) and c). e) and f) provide a graphical representation of the variation of the edge position along the features. The analysis shows that the 3σ variation is below 10% of the CD value.

Table 1. NILS and LER measurements of two grating structures with indicated CD values

CD (nm)	I_{th}	NILS	LER (nm)	LER/CD
175	0.395	3.58	13.55	0.078
225	0.442	3.32	20.86	0.093

4. Summary

An actinic aerial image microscope based on a table-top EUV laser, capable of obtaining high quality images for the evaluation of EUVL mask pattern printability, was demonstrated. The system, designed to mimic the printing conditions of a 0.025 NA 4 × -demagnification EUVL stepper, can obtain images with a spatial resolution of approximately 55 nm within exposure times of 5 to 90 seconds. These results are comparable to current synchrotron-based tools. The uniformity and intensity of the illumination enable the measurement of key parameters of mask pattern printability such as NILS and LER. Extension to higher resolution and thus simulation of higher NA EUVL steppers necessary to reach smaller printing nodes can be done by increasing the NA of the off-axis objective zone plate. Using this approach, zone plates capable of simulating NA above 0.35 are currently available [17]. The results presented demonstrate the capabilities of the microscope for EUVL mask research and development and open the path to the realization of practical standalone EUVL metrology tools for HVM.

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