

# STUDY ON REDUCED PROJECTION EXPOSURE METHOD FOR HIGHER RESOLUTION TO FORM ULSI PATTERN

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The ULSI technology is fast developing technology that supports the various systems of the modern society. These systems depend on the performance of ULSI. Optical lithography provides the formation of fine circuit pattern one after another. It is also the mainstream technology for ULSI manufacturing. Through this technology, ULSI pattern becomes more smaller size in future. A countermeasure technique is required because conventional technology of optical lithography has reached a physical resolution limit.

In this thesis, Phase Shift Mask (PSM) and Optical Proximity Correction (OPC) technologies were studied for their practical use. Experimental results using laser beam profiles controlled by PSM technique or a cover glass were presented. A new PSM composed of an opaque pattern substrate and a phase shifter substrate was also proposed. This two layer PSM was evaluated by both optical image simulation and beam profile measurement. It was found that two layer PSM inserted a cover substrate between mask plane and projection lens is able to achieve better image formation. A new exposure method by optical reverse principle was also proposed. This exposure method is based on insertion of a cover glass between an optical lens and image plane. This exposure method was evaluated by both optical image simulation and beam profile measurement. It was found that this exposure method using a cover glass is able to achieve better image formation.