However, depending on the application of the projection unit, defects may be tolerable up to a certain degree. Thus, the quality of the projection units needs to be assessed in order to guarantee that the respective quality criteria are met by the projection unit.

Thus, the object of the invention is to provide a method as well as a system for assessing the quality of micro- and/or subwavelength-optical projection units.

Summary

According to an aspect, the present disclosure refers to a method for assessing the quality of a multi-channel micro- and/or subwavelength-optical projection unit, comprising the following steps:

illuminating at least a predefined portion of the micro- and/or subwavelength-optical projection unit so that an image is generated by at least two channels of the predefined portion of the multi-channel micro- and/or subwavelength-optical projection unit;

- capturing the image generated by the predefined portion of the projection unit;

- analyzing the image;

- determining at least one characteristic quantity based on the analysis of the image, wherein a value of the characteristic quantity is associated with at least one characteristic feature of the projection unit, at least one defect of the projection unit and/or at least one defect class of the projection unit; and

- assessing the quality of the projection unit based on the at least one characteristic quantity.

According to another aspect, the present disclosure refers to a test system for assessing the quality of a multi-channel micro- and/or subwavelength-optical projection unit, comprising an illumination unit, an image capturing device, an image analysis module and a control module, wherein the control module is

configured to cause the test system to perform the method according to the previous aspect.

According to another aspect, the present disclosure refers to a computer program comprising instructions which, when the program is executed by a processing unit of the control module of the test system according to the previous aspects, cause the test system to carry out the steps of the method according to the previous aspects.

According to an example, the problem is solved by a method for assessing the quality of a multi-channel micro- and/or subwavelength-optical projection unit. The method comprises the following steps: At least a predefined portion of the micro- and/or subwavelength-optical projection unit is illuminated so that an image is generated by at least two channels of the predefined portion of the multi-channel micro- and/or subwavelength-optical projection unit. The image is captured and analyzed. At least one characteristic quantity is determined based on the analysis of the image, wherein a value of the characteristic quantity is associated with at least one characteristic feature of the projection unit, at least one defect of the projection unit and/or at least one defect class of the projection unit. The quality of the projection unit is assessed based on the at least one characteristic quantity.

Subwavelength-optical elements, in particular subwavelength-lenses may also be called nano-optical elements, in particular nano-lenses.

The present disclosure is based on the finding that defects of the projection unit are directly linked to certain defects in the image generated by the projection unit. For example, deviations in the positions of optically active regions of the projection unit and deviations from a desired curvature of the individual optically active regions, and/or pinholes in the wafer each lead to respectively associated characteristic defects in the image.

Further, undesired pinholes in the projection unit cause bright circular spots in the image; unintentional misalignments during the manufacturing process lead to unsharp contours; Mechanical defects on lenses (e.g. scratches and/or cracks) lead to circular black rings and/or dark spots; undesired contaminations in the manufacturing process lead to dark freckles (dark spots), e.g. ununiformities in the pattern.