

(c) repeating said scanning with a different portion of the mask, until the image on the substrate is completed.

10. A process as recited in claim 6, additionally comprising the step of correcting for distortion, said correcting step comprising at least one of the following steps:

- (a) adjusting the scanning rate; or
- (b) adjusting the alignment between the mask and the substrate during the scanning.

11. X-ray lithography apparatus, comprising:

- (a) a source of substantially monochromatic X-rays;
- (b) means for placing in the path of the X-rays a mask, a portion of which mask is relatively permeable to X-rays, whereby X-rays are transmitted through the mask through the relatively X-ray permeable portion;
- (c) a column of reducing zone plates located after the mask, whereby at least some of the X-rays transmitted through the relatively X-ray permeable portion of the mask impinge on said imaging zone plates, whereby at least some of the X-rays transmitted through that portion are focused onto an image plane by said imaging zone plates at an n:1 reduced image ratio;
- (d) means for placing a substrate with an X-ray sensitive resist in the image plane;
- (e) means for synchronously scanning said mask-placing means and said substrate-placing means in opposite directions relative to said zone plates and to said X-ray source, and at a ratio of speeds relative to said zone plates and to said X-ray source equal to the image reduction ratio n:1, whereby a portion of the relatively X-ray permeable portion of the mask is imaged on the substrate at an n:1 reduced image ratio; and
- (f) means for repeating said scanning with a different portion of the mask, until the image on the substrate is completed.

12. Apparatus as recited in claim 11, additionally comprising means for correcting for distortion, said correcting means comprising at least one of the following means:

- (a) means for adjusting the scanning rate; or
- (b) means for adjusting the alignment between the mask-placing means and the substrate-placing means during the scanning.

13. A process for n:1 reduction imaging of the relatively X-ray permeable portion of a mask onto a substrate with an X-ray sensitive resist, comprising the steps of:

- (a) directing substantially monochromatic X-rays onto the mask, whereby X-rays are transmitted through the mask through the relatively X-ray permeable portion;
- (b) causing the transmitted X-rays to impinge on a column of reducing zone plates, whereby at least some of the X-rays are focused onto an image plane by said imaging zone plates at an n:1 reduced image ratio;
- (c) placing the substrate in the image plane;
- (d) synchronously scanning the mask and the substrate in opposite directions relative to said zone plates and to said X-ray source, and at a ratio of speeds relative to said zone plates and to said X-ray source equal to the image reduction ratio n:1, whereby a portion of the relatively X-ray permeable portion of the mask is imaged on the substrate at an n:1 reduced image ratio; and
- (e) repeating said scanning with a different portion of the mask, until the image on the substrate is completed.

14. A process as recited in claim 13, additionally comprising the step of correcting for distortion, said correcting step comprising at least one of the following steps:

- (a) adjusting the scanning rate; or
- (b) adjusting the alignment between the mask and the substrate during the scanning.

\* \* \* \* \*

45

50

55

60

65