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(54) Title: METHODS AND SYSTEMS FOR OVERLAY MEASUREMENT BASED ON SOFT X-RAY SCATTEROMETRY

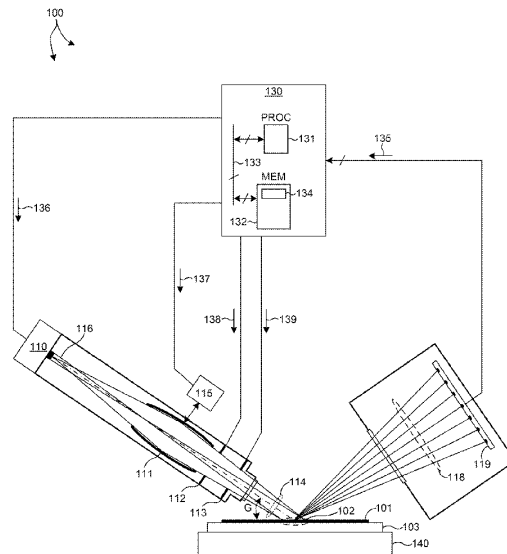


FIG. 3

(57) Abstract: Methods and systems for performing overlay and edge placement errors based on Soft X-Ray (SXR) scatterometry measurement data are presented herein. Short wavelength SXR radiation focused over a small illumination spot size enables measurement of design rule targets or in-die active device structures. In some embodiments, SXR scatterometry measurements are performed with SXR radiation having energy in a range from 10 to 5,000 electronvolts. As a result, measurements at SXR wavelengths permit target design at process design rules that closely represents actual device overlay. In some embodiments, SXR scatterometry measurements of overlay and shape parameters are performed simultaneously from the same metrology target to enable accurate measurement of Edge Placement Errors. In another aspect, overlay of aperiodic device structures is estimated based on SXR measurements of design rule targets by calibrating the SXR measurements to reference measurements of the actual device target.

[Continued on next page]

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