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(54) **Title:** METHODS AND SYSTEMS FOR COMBINING X-RAY METROLOGY DATA SETS TO IMPROVE PARAMETER ESTIMATION

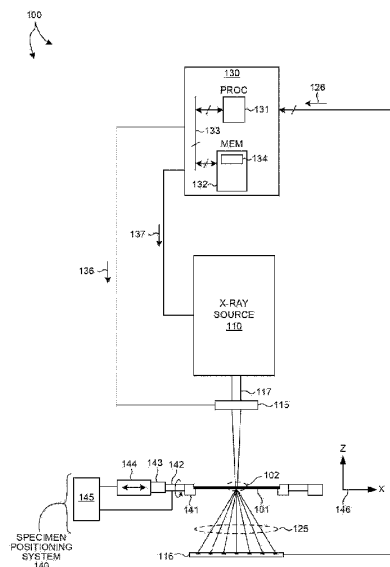


FIG. 1

(57) **Abstract:** Methods and systems for measuring a complex semiconductor structure based on measurement data before and after a critical process step are presented. In some embodiments, the measurement is based on x-ray scatterometry measurement data. In one aspect, a measurement is based on fitting combined measurement data to a simplified geometric model of the measured structure. In some embodiments, the combined measurement data is determined by subtraction of a measured diffraction pattern before the critical process step from a measured diffraction pattern after the critical process step. In some embodiments, the simplified geometric model includes only the features affected by the critical process step. In another aspect, a measurement is based on a combined data set and a trained signal response metrology (SRM) model. In another aspect, a measurement is based on actual measurement data after the critical process step and simulated measurement data before the critical process step.

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