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(54) Title: COMBINED SPECTROSCOPIC REFLECTOMETRY AND PATTERN RECOGNITION BASED MEASUREMENTS OF SEMICONDUCTOR STRUCTURES

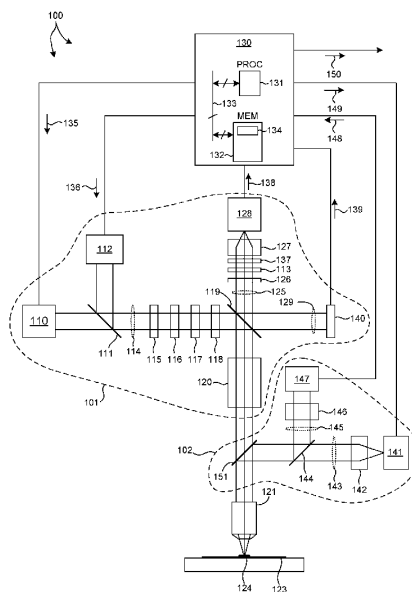


FIG. 1

(57) Abstract: Methods and systems for combined Spectroscopic Reflectometry (SR) and Pattern Recognition (PR) based image measurements of semiconductor structures at high throughput are presented herein. Measurements of large pitch targets and thick targets through die with improved fringe contrast, resolution, and spectral fidelity are enabled. A PR based imaging subsystem generates illumination light ranging from visible to short infrared wavelengths. A SR subsystem generates illumination light ranging from the deep ultraviolet to short infrared wavelengths. The SR subsystem includes low Numerical Aperture (NA) optics to realize a relatively large size illumination and collection spot. Both the SR subsystem and the PR based imaging subsystem share the same objective and resolve signals from different depths of a structure under measurement. In some embodiments, a combined machine learning based measurement model estimates values of one or more parameters of interest based on both SR and PR image signals.

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