

Claims

1. Method for determining the thickness of one or more layers of a sample stack of layers (700, 702) or other properties influencing the intensity of light (706) reflected by the sample stack with an assembly comprising a light source (710) for illuminating the sample stack of layers (700, 702) and a camera with a detector (800) for detecting the intensity of light (706) reflected by the sample stack of layers in defined wavelength ranges (340, 350, 360, 370, 380, 390), the method comprising the steps of:
 - (a) illuminating the sample stack of layers (700, 702) with light (703, 704, 50) from the light source (710);
 - (b) detecting the intensity of light (706) reflected by the sample stack of layers (700, 702) with the detector (800) in different wavelength ranges (340, 350, 360, 370, 380, 390); and
 - (c) determining the thickness or other property from the intensity detected by the detector (800);

characterized in that

 - (d) the detector (800) is an array detector with a plurality of detector elements in lines and columns;
 - (e) an image of the sample stack of layers (700) is generated on the detector (800);
 - (f) the detector (800) comprises a plurality of sections in the form of parallel stripes (761, 762, 763, 764, 765, 766), the stripes detecting the intensity of light (706) reflected by the sample stack of layers (700) simultaneously;
 - (g) light of one selected wavelength range (340, 350, 360, 370, 380, 390) only is detected by each of the plurality of sections (761, 762, 763, 764, 765, 766) of the detector (800); and
 - (h) a movement of the image of the sample stack of layers (700) on the detector (800) or of the parallel stripes (761, 762, 763, 764, 765, 766) is generated in a direction perpendicular to the longitudinal direction of the parallel stripes such that each point of the inspected sample stack of layers is detected at least once in each of the different wavelength ranges (340, 350, 360, 370, 380, 390).
2. Method according to claim 1, characterized in that the detector elements in the same section of the detector (800) are sensitive to one of the different wavelength ranges (340, 350, 360, 370, 380, 390) only.

3. Method according to claim 1, characterized in that the light in the optical path between the light source (710) and the detector (800) is filtered by a plurality of different bandpass filters (760) in a striped geometrical order, each bandpass filter (760) transmitting light in one of the selected wavelength (340, 350, 360, 370, 380, 390) ranges only and positioned in an object plane (705), the detector plane (800), an intermediate image plane or any other plane conjugated to an object.
4. Method according to any of the preceding claims, characterized in that a series of images are taken with the detector (800) and a movement of the image of the sample stack of layers (700) on the detector (800) or a movement of the parallel stripes (761, 762, 763, 764, 765, 766) is generated before each of the images is taken, the length of the movement corresponding to the width of the sections on the detector (800).
5. Method according to any of the preceding claims, characterized in that the amount of different wavelength ranges (340, 350, 360, 370, 380, 390) is identical to the amount of stripes (761, 762, 763, 764, 765, 766).
6. Method according to any of the preceding claims, characterized in that the sample stack of layers (700) has less layers (20, 30) than wavelength ranges (340, 350, 360, 370, 380, 390) and the thickness and/or other property of at least one layer (20, 30) is determined from two or more measurements.
7. Method according to claim 6, characterized in that the thickness and/or other property of at least one layer (20, 30) is determined from a plurality of measurements without a measured calibration curve.
8. Method according to claim 7, characterized in that the thickness and/or other property determined without a measured calibration curve is calculated using theoretical values of material properties of the layers (20, 30).
9. Method according to any of claims 1 to 6, characterized in that a measured calibration curve (361) is used for each inspected layer (20, 30) to determine the thickness and/or other property.
10. Inspection assembly (701) for determining the thickness of one or more layers (20, 30) of a sample stack of layers (700) or other properties influencing the intensity of light reflected (706) by the sample stack of layers (700) comprising:
 - (a) a light source (710) for illuminating the sample stack of layers (700); and
 - (b) a camera with a detector (800) for detecting the intensity of light (706) reflected by the sample stack of layers in defined, different wavelength ranges (340, 350, 360, 370, 380, 390); and

(c) computing means for determining the thickness or other property from the intensity detected by the detector (800);

characterized in that

(d) the detector (800) is an array detector with a plurality of detector elements in lines and columns;

(e) optical means (740, 780) are provided for generating an image of the sample stack of layers (700) on the detector (800);

(f) the detector (800) comprises a plurality of sections in the form of parallel stripes (761, 762, 763, 764, 765, 766), the stripes adapted to simultaneously detect the light (706) reflected by the sample stack of layers (700);

(g) filter means (760) are provided for transmitting only light of one selected wavelength range (340, 350, 360, 370, 380, 390) to only one of each of the plurality of sections (761, 762, 763, 764, 765, 766) of the detector (800) or detector elements adapted to measure light of one selected wavelength range (340, 350, 360, 370, 380, 390) only in each of the plurality of sections (761, 762, 763, 764, 765, 766); and

(h) moving means (707) are provided for moving the image of the sample stack of layers (700) on the detector (800) or of the parallel stripes in a direction perpendicular to the longitudinal direction of the parallel stripes such that each point of the inspected sample stack of layers (700) is detectable at least once in each of the different wavelength ranges (340, 350, 360, 370, 380, 390).

11. Inspection assembly (701) according to claim 10, characterized in that the detector elements in the same section of the detector (800) are sensitive to one of the different wavelength ranges (340, 350, 360, 370, 380, 390) only.
12. Inspection assembly (701) according to claim 10, characterized in that a plurality of different bandpass filters in a striped geometrical order is provided in the object plane (705), the detector plane, an intermediate image plane or any other plane conjugated to the object between the light source (710) and the detector (800), each bandpass filter (760) transmitting light in one of the selected wavelength ranges (340, 350, 360, 370, 380, 390) only.
13. Inspection assembly (701) according to any of the claims 10 to 12, characterized in that the amount of different wavelength ranges (340, 350, 360, 370, 380, 390) is identical to the amount of stripes (761, 762, 763, 764, 765, 766).

14. Inspection assembly (701) according to any of the claims 10 to 13, characterized in that the detector (800) is formed by a multi-color line camera with a plurality of wavelength ranges (340, 350, 360, 370, 380, 390).
15. Inspection assembly (701) according to claim 14, characterized in that the lines of the line camera detector are formed by TDI (time delayed integration) sensor blocks.