Claims

1. A device for the interferometric measuring of an object, comprising a light source to generate an emitted beam, a beam slitting device for splitting the emitted beam into a measuring beam and a first reference beam, an optic interference device, and a first detector, with the interfering device and the first detector being embodied cooperating such that the measuring beam at least partially reflected by the object and the first reference beam are interfered on at least one detection area of the first detector, characterized in that the beam splitting device is embodied to divide the emitted beam into a measuring beam, a first reference beam, and at least a second reference beam, that the device comprises at least a second detector, and the interfering device and the second detector are embodied cooperating such that the measuring beam as a first reception beam, at least partially scattered by the object, and the second reference beam are interfered on at least one detector area of the second detector.

2. A device according to claim 1, characterized in that the device comprises a first lens, which is arranged in the radiation path of the measuring beam, and a first reference beam between the object and the first detector, that preferably the numeric aperture of the lens is greater than 0.1, preferably greater than 0.15, particularly greater than 0.2.

3. A device according to claim 2, characterized in that the first lens is further arranged in the radiation path of the second reference beam between the object and the second detector.

4. A device according to claim 3, characterized in that the device comprises a second lens which is arranged in the radiation path of the second reference beam between the object and the second detector, that preferably the numeric aperture of the second lens is less than 0.15, preferably less than 0.1.

5. A device according to one of the previous claims, characterized in that the device is embodied for a heterodyne measuring via the first detector by a frequency displacement device being provided for the frequency shift between the measuring beam and the first reference beam, that preferably the frequency displacement device is provided for the frequency displacement between the measuring beam and all reference beams.

6. A device according to one of the previous claims, characterized in that the device is embodied as a confocal microscope with regards to the radiation paths of the measuring beam and the first reference beam.

7. A device according to one of the previous claims, characterized in that the beam splitting device is embodied to split the emitted beam into a measuring beam, a first reference beam, a second reference beam, and at least a third reference beam, that the device

comprises at least a third detector, and the interference device and the third detector are embodied cooperating such that the measuring beam, at least partially scattered by the object, is interfered as a second reception beam and the third reference beam is interfered on at least one detector area of the third detector, that preferably the device is embodied such that a first level, which is defined by the measuring beam and the second reference beam, forms an angle greater than 45°, preferably greater than 85° with a second level, which is formed by the measuring beam and the third reference beam.

8. A device according to one of the previous claims, characterized in that the angle between the measuring beam and at least one receiving beam, preferably between the measuring beam and all reception beams, is less than 30°.

9. A device according to one of the previous claims, characterized in that the radiation source is embodied as a longitudinal single-mode laser, preferably is additionally embodied as a transversally single-mode laser, particular a laser with a M^2-factor smaller than 1.5.

10. A device according to one of the previous claims, characterized in that the radiation source is embodied as a laser with a wavelength in the visible range.

11. A device according to claim 10, characterized in that the light source is embodied as a DPSS-laser with a wavelength of 532 nm.

12. A method for the interferometric measuring of an object, comprising the following processing steps:

A Generating an emitted beam via a light source;

B Splitting an emitted beam via a beam splitting device into a measuring beam and a first reference beam;

C Interfering a first reference beam and the measuring beam, at least partially reflected by the object, to at least one detector surface of a first detector;

characterized in that in the processing step B the emitted beam is additionally split into at least a second reference beam and the second reference beam is interfered on at least one detector area of the second detector with the measuring beam, scattered at least partially by the object.

13. A method according to claim 12, characterized in that the measuring signals of the first and the second detector are each phase modulated for a multi-dimensional assessment of a deflection of the surface of the object.

14. A method according to one of claims 12 through 13, characterized in that the measuring signals of the first detector are phase modulated for an assessment of a deflection of the surface of the object and that the measuring signals of the second detector are amplitude modulated for an evaluation of the intensity of the scattered measuring beam.

15. A method according to claim 14, characterized in that the surface topography of the object is determined, comprising the following processing steps:
    - Moving the object in reference to the measuring beam, preferably essentially perpendicular in reference to the optic axis of the measuring beam, and
    - Measuring the deflection via the first detector as well as measuring the scattered light via the second detector.

Claims

1. A device for the interferometric measuring of an object, comprising a light source to generate an emitted beam, a beam slitting device for splitting the emitted beam into a measuring beam and a first reference beam, an optic interference device, and a first detector, with the interfering device and the first detector being embodied cooperating such that the measuring beam at least partially reflected by the object and the first reference beam are interfered on at least one detection area of the first detector, characterized in that the beam splitting device is embodied to divide the emitted beam into a measuring beam, a first reference beam, and at least a second reference beam, that the device comprises at least a second detector, and the interfering device and the second detector are embodied cooperating such that the measuring beam as a first reception beam, at least partially scattered by the object at a different angular range that the at least partially reflected measuring beam, and the second reference beam are interfered on at least one detector area of the second detector.

2. A device according to claim 1, characterized in that the device comprises a first lens, which is arranged in the radiation path of the measuring beam, and a first reference beam between the object and the first detector, that preferably the numeric aperture of the lens is greater than 0.1, preferably greater than 0.15, particularly greater than 0.2.

3. A device according to claim 2, characterized in that the first lens is further arranged in the radiation path of the second reference beam between the object and the second detector.

4. A device according to claim 3, characterized in that the device comprises a second lens which is arranged in the radiation path of the second reference beam between the object and the second detector, that preferably the numeric aperture of the second lens is less than 0.15, preferably less than 0.1.

5. A device according to one of the previous claims, characterized in that the device is embodied for a heterodyne measuring via the first detector by a frequency displacement device being provided for the frequency shift between the measuring beam and the first reference beam, that preferably the frequency displacement device is provided for the frequency displacement between the measuring beam and all reference beams.

6. A device according to one of the previous claims, characterized in that the device is embodied as a confocal microscope with regards to the radiation paths of the measuring beam and the first reference beam.

7. A device according to one of the previous claims, characterized in that the beam splitting device is embodied to split the emitted beam into a measuring beam, a first reference beam, a second reference beam, and at least a third reference beam, that the

device comprises at least a third detector, and the interference device and the third detector are embodied cooperating such that the measuring beam, at least partially scattered by the object, is interfered as a second reception beam and the third reference beam is interfered on at least one detector area of the third detector, that preferably the device is embodied such that a first level, which is defined by the measuring beam and the second reference beam, forms an angle greater than 45°, preferably greater than 85° with a second level, which is formed by the measuring beam and the third reference beam.

8. A device according to one of the previous claims, characterized in that the angle between the measuring beam and at least one receiving beam, preferably between the measuring beam and all reception beams, is less than 30°.

9. A device according to one of the previous claims, characterized in that the radiation source is embodied as a longitudinal single-mode laser, preferably is additionally embodied as a transversally single-mode laser, particular a laser with a M^2-factor smaller than 1.5.

10. A device according to one of the previous claims, characterized in that the radiation source is embodied as a laser with a wavelength in the visible range.

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12. A method for the interferometric measuring of an object, comprising the following processing steps:
    A Generating an emitted beam via a light source;
    B Splitting an emitted beam via a beam splitting device into a measuring beam and a first reference beam;
    C Interfering a first reference beam and the measuring beam, at least partially reflected by the object, to at least one detector surface of a first detector;
    characterized in that in the processing step B the emitted beam is additionally split into at least a second reference beam and the second reference beam is interfered on at least one detector area of the second detector with the measuring beam, scattered at least partially by the object at a different angular range that the at least partially reflected measuring beam.

13. A method according to claim 12, characterized in that the measuring signals of the first and the second detector are each phase modulated for a multi-dimensional assessment of a deflection of the surface of the object.

14. A method according to one of claims 12 through 13, characterized in that the measuring signals of the first detector are phase modulated for an assessment of a deflection of the surface of the object and that the measuring signals of the second

detector are amplitude modulated for an evaluation of the intensity of the scattered measuring beam.

15. A method according to claim 14, characterized in that the surface topography of the object is determined, comprising the following processing steps:
    - Moving the object in reference to the measuring beam, preferably essentially perpendicular in reference to the optic axis of the measuring beam, and
    - Measuring the deflection via the first detector as well as measuring the scattered light via the second detector.