Claims

1. An illumination system for collimated illumination, comprising:
a configurable area light source arranged in an illumination optical axis of an illumination beam path, wherein the configurable area light source is configured such that different beam shapes are settable between a first shape and a second shape in real-time wherein the first shape is different from the second shape; an imaging optical axis of an imaging beam path; at least one illumination lens positioned in the illumination beam path for directing a collimated beam onto a field of view on a surface of an object, wherein a value of an angle of incidence of the illumination optical axis of the illumination beam path equals a value of an angle of reflectance of the imaging optical axis of the imaging beam path;
a beam splitter positioned in the illumination beam path after the at least one illumination lens;
a mirror; and,
a holder,
wherein the beam splitter is mounted in the holder and the mirror is mounted to the holder such that light emitted from the configurable area light source is directed from the mirror to the at least one illumination lens.

2. The illumination system as claimed in claim 1, wherein the illumination lens is a Fresnel lens.

3. The illumination system as claimed in claim 1, wherein the beam splitter directs collimated illumination light from the configurable area light source along a redirected illumination optical axis of the illumination beam path onto the surface of the object, and wherein the imaging optical axis of the imaging beam path is coaxial with the redirected illumination optical axis of the illumination beam path.

4. The illumination system as claimed in claim l, wherein the settable different beam shapes enable a variation of a collimated beam opening angle.

5. The illumination system as claimed in claim l, wherein the configurable area light source is a 2-dimensional arrangement of a plurality of light emitting elements.

6. The illumination system as claimed in claim 5, wherein the plurality of light emitting elements includes a plurality of light emitting diodes.

7. The illumination system as claimed in claim 6, wherein the 2-dimensional arrangement of the plurality of light emitting elements is a matrix arrangement.

8. The illumination system as claimed in claim l, wherein the configurable area light source comprises:
a single light emitting element, providing a homogeneous area illumination; and an LCD-screen, positioned in front of the single light emitting element.

9. The illumination system as claimed in claim 8, wherein the LCD-screen comprises a plurality of individual pixels in a 2-dimensional arrangement and the individual pixels are addressable in order to change a transmittance value for the illumination light.

10. The illumination system as claimed in claim l, further comprising:

a control and drive device assigned to the configurable area light source so that a plurality of concentric geometrical shapes of illumination are generated in order to obtain different beam diameters.

11. The illumination system as claimed in claim 10, wherein the plurality of concentric geometrical shapes includes a plurality of concentric circles.

12. The illumination system as claimed in claim 10, wherein the plurality of concentric geometrical shapes includes a plurality of concentric rectangles.

13. The illumination system as claimed in claim 10, wherein the plurality of concentric geometrical shapes includes a plurality of concentric hexagons.

14. The illumination system as claimed in claim 6, wherein the 2-dimensional arrangement of the plurality of light emitting elements is defined by an arrangement of the plurality of light emitting elements in a plurality of concentric geometrical shapes.

15. The illumination system as claimed in claim 14, further comprising: a control and drive device assigned to the arrangement of the plurality of concentric geometrical shapes of the plurality of light emitting elements to drive the plurality of light emitting elements of the individual concentric geometrical shapes in order to obtain different beam diameters.

16. The illumination system as claimed in claim 15, wherein the plurality of concentric geometrical shapes is a plurality of concentric circles.

17. The illumination system as claimed in claim 15, wherein the plurality of concentric geometrical shapes is a plurality of concentric rectangles.

18. The illumination system as claimed in claim 15, wherein the plurality of concentric geometrical shapes is a plurality of concentric hexagons.

19. An inspection tool, comprising:

a camera, arranged in an imaging optical axis of an imaging beam path; an imaging lens positioned in the imaging beam path for imaging at least a portion of a surface of an object into an image plane of the camera; an illumination system with a configurable area light source, wherein the configurable area light source is arranged in an illumination optical axis of an illumination beam path and the configurable area light source is configured such that different beam shapes are settable between a first shape and a second shape in real-time wherein the first shape is different from the second shape; at least one illumination lens positioned in the illumination beam path for directing a collimated beam onto a field of view on the surface of the object, wherein a value of an angle of incidence of the illumination optical axis of the illumination beam path equals a value of an angle of reflectance of an imaging optical axis of the imaging beam path; a beam splitter positioned in the illumination beam path after the at least one illumination lens;

a mirror; and,

a holder,

wherein the beam splitter is mounted in the holder and the mirror is mounted to the holder such that light emitted from the configurable area light source is directed from the mirror to the at least one illumination lens.

20. The inspection tool as claimed in claim 19, wherein the beam splitter directs collimated illumination light from the configurable area light source along a redirected optical axis of the illumination beam path onto the surface of the object, and wherein the imaging optical axis of the imaging beam path is coaxial with the redirected optical axis of the illumination beam path.

21. The inspection tool as claimed in claim 20, further comprising:
a sample carrier wherein :
the surface of the object is held by the sample carrier, and faces a first side face of the holder; and the mirror is mounted to a second side face of the holder such that light from the configurable area light source is directed to the at least one illumination lens.

22. The inspection tool as claimed in claim 20, further comprising:
a sample carrier wherein:
the surface of the object is held by the sample carrier, and faces a first side face of the holder; and a second side face of the holder carries the configurable area light source so that light from the configurable area light source impinges on the beam splitter.

23. The inspection tool as claimed in claim 19, wherein the settable different beam shapes enable a variation of a collimation beam opening angle.

24. The inspection tool as claimed in claim 19, further comprising:
a plurality of light emitting elements:
positioned on a carrier in a 2-dimensional arrangement; and defining the configurable area light source, wherein:
the plurality of light emitting elements are assigned to a control and drive device such that the light emitting elements in the plurality of light emitting elements are addressable individually and a plurality of patterns can be achieved by the configurable area light source; and light beams generated according to a pattern in the plurality of patterns have a light beam opening angle.

25. The inspection tool as claimed in claim 24, wherein the 2-dimensional arrangement of the plurality of light emitting elements is a matrix arrangement.

26. The inspection tool as claimed in claim 19, wherein:
the configurable area light source comprises a single light emitting element, providing a homogeneous area lighting; and a LCD screen, positioned in front of the single light emitting element.

27. The inspection tool as claimed in claim 26, further comprising:
a control and drive device, wherein the LCD-screen comprises a plurality of individual pixels in a 2-dimensional arrangement and the individual pixels are addressable by the control and drive device in order to change a transmittance value of the individual pixels.

28. The inspection tool as claimed in claim 19, further comprising:
a control and drive device assigned to the configurable area light source so that a plurality of concentric geometrical shapes of illumination are generated in order to obtain different beam diameters.

29. The inspection tool as claimed in claim 19, wherein the imaging beam path is folded at least one time for directing light from the field of view on the surface of the object onto the image plane of the camera.

30. The inspection tool as claimed in claim 19, wherein the

illumination beam path is folded at least one time for directing light from the configurable area light source onto the surface of the object.

31. A method for inspecting an object, comprising:

(a) directing illumination light, the illumination light defining a light beam opening angle, from a configurable area light source via a mirror mounted to a holder to an illumination lens along an illumination beam path, through a beam splitter mounted in the holder, onto a surface of an object;

(b) directing reflected light from the surface of the object along an imaging beam path;

(c) imaging the reflected light from the surface of the object with an imaging lens onto an image plane of a camera;

(d) changing the shape of the illumination light from a first shape to a second shape wherein the first shape is different from the second shape;

(e) repeating the steps a — d; and

(f) generating a field of view on the surface of the object in real time images with the first shape and the second shape, respectively.

32. The method of claim 31, further comprising:

setting different opening angles of the light beam by different light diameters which are generated by controlling and driving the configurable area light source so that a defined light diameter is achieved.

33. The method of claim 31, wherein the configurable area light source is a matrix arrangement of the plurality of light emitting elements.

34. The method of claim 31, wherein the configurable area light source comprises a single light emitting element, providing a homogeneous area lighting, and a LCD screen, positioned in front of the single light emitting element.

35. The method of claim 31, further comprising:
assigning a control and drive device to the configurable area light source so that a plurality of concentric and addressable geometrical shapes are generated in order to obtain different beam diameters.

36. The method of claim 33, further comprising:
arranging the plurality of light emitting elements in concentric geometrical shapes; and addressing, with the control and drive device, the concentric geometrical shapes in order to obtain different beam diameters.

37. An illumination system for collimated illumination, comprising:
a configurable area light source arranged in an illumination optical axis of an illumination beam path, wherein the configurable area light source is configured such that different beam shapes are settable between a first shape and a second shape in real-time wherein the first shape is different from the second shape; a beam splitter is positioned in the illumination beam path after the at least one illumination lens, wherein the beam splitter directs collimated illumination light from the configurable area light source along a redirected illumination optical axis of the illumination beam path onto a surface of an object and an imaging optical axis of the imaging beam path is coaxial with the redirected optical axis of the illumination beam path; at least one illumination lens positioned in the illumination beam path for directing a collimated beam onto a field of view on the surface of the object, wherein a value of an angle of incidence of the optical axis of the

illumination beam path equals a value of an angle of reflectance of the optical axis of the imaging beam path; a mirror; and, a holder,

wherein the beam splitter is mounted in the holder and the mirror is mounted to the holder such that light emitted from the configurable area light source is directed from the mirror to the at least one illumination lens.

38. The illumination system of claim 37, further comprising:
a control and drive device assigned to the configurable area light source such that a plurality of concentric geometrical shapes are generated by the configurable area light source in order to obtain different beam diameters.

39. The illumination system as claimed in claim l, wherein the
first shape provides a first collimation angle and the second shape provides a second collimation angle different than the first collimation angle.

40. The inspection tool as claimed in claim 19, wherein the
first shape provides a first collimation angle and the second shape provides a second collimation angle different than the first collimation angle.

41. The method of claim 31, wherein the first shape provides a
first collimation angle and the second shape provides a second collimation angle different than the first collimation angle.

42. The illumination system of claim 37, wherein the first shape provides a first collimation angle and the second shape provides a second collimation angle different than the first collimation angle.