AMENDED CLAIMS
received by the International Bureau on 20 March 2013 (20.03.2013)

1. A method for inspection of light emitting semiconductor devices, comprising the following steps:

- choosing a waveband λ_A +/- λ_B of an illuminating light source such that it is not absorbed by layers surrounding an active layer but only absorbed by the active layer;

- illuminating with the light source at least an area of the light emitting semiconductor with the waveband of light, wherein the waveband of light λ_A + λ_B can generate electron-hole pairs in the light emitting semiconductor to be inspected so that the electron-hole pairs being generated in the active layer of the light emitting semiconductor and the light emitting semiconductor emitting light which is caused by a recombination process of the electron hole pairs;

- detecting through an objective lens at least a part of the light λ_C emitted by the light emitting semiconductor, wherein the emitted light is captured with a sensor of a camera that is sensitive to wavelengths of the emitted light and the wavelength of the emitted light is above the a width of the waveband; and

- transferring data of the emitted light, captured with the sensor, to a computer system for calculating inspection results of light emitting semiconductor.

2. The method of claim 1, wherein the light emitted by the light emitting semiconductor has a similar wavelength $\geq\lambda_C$ as if a forward voltage would be applied to the light emitting semiconductor, where $(\lambda_A + \lambda_B) < \lambda_C$

3. The method of claim 1, wherein the light source illuminates the area of the light emitting semiconductor directly with the waveband of light λ_A +/- λ_B for illumination which is generated by a plurality of LEDs of the light source.

4. The method of claim 3, wherein a second filter is positioned in a detection beam path after the objective lens, so that only the light emitted by the light emitting semiconductor reaches the sensor of the camera.

5. The method of claim 1, wherein the light source illuminates the area of the light emitting semiconductor through an objective lens, wherein the waveband of light λ_A +/- λ_B for illumination is generated by inserting a first filter prior to the objective lens in an illumination beam path.

6. The method of claim 5, wherein a second filter is positioned in a detection beam path after the objective lens, so that only the light emitted by the light emitting semiconductor reaches the sensor of the camera.

7 The method of claim 6, wherein the second filter in the detection beam path prohibits the reflections of the incident light to reach the sensor of the camera and at least a wavelength of λ_C passes the second filter.

8. The method of claim 1, wherein the active layer being a InGaN layer in the case of a blue LED.

9. The method of claim 8, where the waveband of the illumination light source has a range between 380nm and 440nm in the case of a blue LED.

10. The method of claim 1, wherein the light emitting semiconductor has a plurality of LED die/chips structured on a substrate and a stage is moving the substrate with the LED die/chips and the sensor of the camera captures an image of the entire surface of the substrate and a wafermap of the surface with the LED die/chips the is shown on a display of the computer system, wherein to each class of gray value a separate color code is assigned.

11. The method of claim 10, wherein the inspection result is at least one gray value per LED and the inspection results of the LEDs are sorted in at least two bins according to their gray value.

12. The method of claim 11, wherein a calibration of quality levels is done by measuring a light output power of an LED sample by connecting it to a electrical prober.

13. The method of claim 11, wherein the inspection result is at least two gray values per LED die/chip, the variations or differences in gray value of one LED die/chip are used as a quality measure of the LED die/chip.

14. The method of claim 10, wherein the inspection result is at least one gray value per LED die/chip and the method comprises the steps of:

- taking at least two inspection images under same conditions of each LED die/chip;
- and/or taking the images under varying illumination intensity and/or exposure settings which are configurable;
- generating a histogram of the gray values is generated for each LED die; and
- analyzing the histogram distribution in order to establish a pass or a fail criteria.

15 The method of claim 1, wherein the illuminating light source is a ring light.

16. An apparatus for inspection of light emitting semiconductor devices on a substrate, comprises:

- a light source;
- an objective lens defining a detection beam path,;
- a camera with a sensor positioned in the detection beam path, for receiving light from the light emitting semiconductor devices via the objective lens; wherein the sensor registers grey scale values of the light emitting semiconductor devices;
- a computer system for calculating a wafermap form data registers by the sensor; and
- a display in order to visually display the wafermap.

17. The apparatus of claim 16, wherein a second filter is positioned in the detection beam path.

18. The apparatus of claim 17, wherein the second filter in the detection beam path prohibits the reflections of the incident light to reach the sensor and at least a wavelength of λ_C passes the second filter.

19. The apparatus of claim 16, wherein the light source is a ring light.

20. The apparatus of claim 19, wherein the ring light has a plurality of LEDs.

21. The apparatus of claim 16, wherein a first filter in an illumination beam path of the light source is designed to pass a waveband $\lambda_A + \lambda_B$ and the second filter in the detection beam path prohibits the reflections of the incident light to reach the sensor and at least a wavelength of λ_C passes the second filter.

22. Apparatus of claim 21, wherein the light source is a coaxial light source.

23. Apparatus of claim 16, wherein the light source is a pulsed light source or a continuous light source.

24. Apparatus of claim 21, wherein the waveband constraint $(\lambda_A + \lambda_B) < \lambda_C$ is implemented using optical first filter and second filter.

25. Apparatus of claim 16, wherein a stage, movable in the X/Y-direction is provided and the computer system provides a controlled movement of the stage so that an entire surface of the light emitting semiconductor devices on the substrate is imaged via the objective lens in the sensor of the camera.

26. Apparatus of claim 16, wherein the light emitting semiconductor devices are LED die/chips and the emitted light of the LED is caused by a recombination process of electron hole pairs that are generated by the illumination in an active layer of the LED and has a similar wavelength as if a forward voltage would be applied to the LED.

27. An apparatus for inspection of light emitting semiconductor devices on a substrate comprises:

- a light source, configured as a ring light source;
- an objective lens defining a detection beam path;

- a camera with a sensor positioned in the detection beam path, for receiving light from the light emitting semiconductor devices via the objective lens and a second filter; wherein the sensor registers grey scale values of the light emitting semiconductor devices;

- a computer system for calculating a wafermap from data registers by the sensor; and

- a display in order to visually display the wafermap.

28. An apparatus for inspection of light emitting semiconductor devices on a substrate, comprises:

- a light source which is a coaxial light source;

- an objective lens defining an illumination beam path, wherein a first filter is positionable prior to the objective lens in the illumination beam path;

- a camera with a sensor positioned in a detection beam path, for receiving light from the light emitting semiconductor devices via the objective lens and a second filter; wherein the sensor registers grey scale values of the light emitting semiconductor devices;

- a computer system for calculating a wafermap form data registers by the sensor; and

- a display in order to visually display the wafermap.

CLAIMS

1. An invention not claimed in any divisional application.