Claims

1. An organic light-emitting diode having a lossy optical resonator and an emitter layer (5) within the optical resonator, which can generate light by recombination of electrons with holes, characterized in that the light-emitting diode comprises a layer which is located within the resonator and consists of a photolithograpically structurable material wherein the material is especially photochemically crosslinkable, or a photoresist which becomes soluble through exposure.

2. The light-emitting diode according to Claim 1 having at least one layer (4, 20, 24) within the optical resonator, the layer being of variable thickness.

3. The light-emitting diode according to one of the preceding claims having an emitter layer (5, 19) that is designed such that it is capable of emitting white light.

4. The light-emitting diode according to the preceding claim wherein the emitter layer consists of a material having oxetane as a reactive group.

5. The light-emitting diode according to one of the preceding claims wherein the emitter layer is an RGB copolymer, a blend of red, green and blue-emitting components or is or comprises a layer system comprising layers emitting red, green and blue.

6. The light-emitting diode according to one of the preceding claims wherein completely or partly reflecting layers (2, 7) of the optical resonator consist of silver, aluminum or gold or are designed as Bragg mirrors.

7. The light-emitting diode according to one of the preceding claims wherein an electron or hole conducting layer (4) consists of a photochemically crosslinkable material and this layer is of variable thickness.

8. The light-emitting diode especially according to one of the preceding claims, having a layer (4) within a lossy optical resonator the layer thickness of which changes along a wedge-like or staircase-like shape.

9. The light-emitting diode especially according to one of the preceding claims, having a layer within a lossy optical resonator wherein said layer comprises more than three different layer thicknesses, preferably at least six, most preferably ten different layer thicknesses.

10. A display having light-emitting diodes according to one of the preceding claims comprising a layer comprising three different layer thicknesses.

11. A lighting device having light-emitting diodes according to one of the preceding claims comprising a layer (4) within a lossy optical resonator wherein the thickness of said layer continuously increases and/or decreases.

12. A process of production of a light-emitting diode according to one of the preceding claims which includes that an emitter layer as well as an electrically conductive or electrically semiconductive layer consisting of photochemically crosslinkable material are deposited on top of the mirror layer of a lossy optical resonator wherein the layer thickness of the electrically conductive or electrically semiconductive layer is adjusted by means of a photolithographical process, and wherein a second mirror layer of the lossy optical resonator is deposited on top of these layers.

13. The process according to the preceding claim wherein the lithographical

process is performed by locating a gray-scale mask on top of the photochemically crosslinkable material, exposing the photochemically crosslinkable material through the gray-scale mask and subsequently removing the non-crosslinked areas.

CLAIMS

1. An organic light-emitting diode having

a lossy optical resonator comprising two mirrors, a reflective mirror and a partially reflective and partially penetrable mirror such that a standing wave forms in the resonator and a light beam is able to escape after reflection, and

an emitter layer (**5**) within the optical resonator, which can generate light by recombination of electrons with holes, wherein

the organic light-emitting diode comprises an electron or hole conducting layer (**4**, **20**, **24**) which is located within the optical resonator and composed of a photolithographically structurable material located between the two mirrors,

the photolithographically structurable material is especially photochemically crosslinkable, or a photoresist which becomes soluble through exposure, and

thickness of said electron or hole conducting layer (**4**, **20**, **24**) changes.

2. The light-emitting diode according to claim 1 having an emitter layer (**5**, **19**) that is designed such that it is capable of emitting white light.

3. The light-emitting diode according to claim 2 wherein the emitter layer is composed of a material having oxetane as a reactive group.

4. The light-emitting diode according to claim 1 wherein the emitter layer is an RGB copolymer, a blend of red, green and blue-emitting components or comprises a layer system comprising layers emitting red, green and blue.

5. The light-emitting diode according to claim 1 wherein completely or partly reflecting layers (**2**, **7**) of the optical resonator consist of silver, aluminum or gold or are designed as Bragg mirrors.

6. The light-emitting diode according to claim 1, wherein the thickness of said electron or hole conducting layer (**4**) changes along a wedge-like or staircase-like shape.

7. The light-emitting diode especially according to claim 1, having a layer within the lossy optical resonator, wherein said layer comprises more than three different layer thicknesses, preferably at least six, most preferably ten different layer thicknesses.

8. A display having light-emitting diodes according to claim 1 comprising a layer comprising three different layer thicknesses.

9. A lighting device having light-emitting diodes claim 1, wherein the thickness of said electron or hole conducting layer (**4**) continuously increases and/or decreases.

10. A process of production of an organic light-emitting diode according to claim 1, comprising the steps of

depositing an electron or hole conducting layer (**4**, **20**, **24**) composed of photochemically crosslinkable material on top of a mirror layer (**2**) of a lossy optical resonator,

adjusting thickness of the electron or hole conducting layer (**4**, **20**, **24**) by a photolithographical process to vary the layer thickness,

depositing an emitter layer (**5**) on top of the electron or hole conducting layer (**4**, **20**, **24**), and

depositing a second mirror layer (**7**) of the lossy optical resonator on top of the emitter (**5**) and electron or hole conducting (**4**, **20**, **24**) layers.

11. The process according to claim 10 wherein the lithographical process is performed by locating a gray-scale mask on top of the photochemically crosslinkable

material, exposing the photochemically crosslinkable material through the gray-scale mask and subsequently removing the non-crosslinked areas.

12. The process according to claim 11 wherein the gray-scale mask has at least 3 varying light permeability in different locations.

13. The light-emitting diode according to claim 2 wherein the emitter layer is an RGB copolymer, a blend of red, green and blue-emitting components or comprises a layer system comprising layers emitting red, green and blue.

14. The light-emitting diode according to claim 1, wherein the thickness of said electron or hole conducting layer (**4**, **20**, **24**) gradually changes in wedge-like shape.

15. The light-emitting diode according to claim 1, comprising

a silicon wafer (**1**),

a first mirror layer (**2**) located on the wafer (**1**) and forming at least part of said reflective mirror,

an oxide layer (**3**) located on the first mirror layer (**2**),

the electron or hole conducting layer (**4**) of variable thickness located on the oxide layer (**3**),

the emitter layer (**5**) located on the electron or hole conducting layer (**4**),

an electron injecting layer (**6**) located on the emitting layer (**5**), and

a second mirror layer (**7**) located on the electron injecting layer (**6**) and forming at least part of said partially reflective and partially penetrable mirror.

16. The light-emitting diode according to claim 15, wherein the electron or hole conducting layer (**4**) gradually changes in wedge-like shape.

17. The light-emitting diode according to claim 1, comprising a single, continuous, electron or hole conducting layer (**4**, **20**, **24**) of varying thickness.