Claims

1. A light emitting pixel unit, comprising:

at least one mesa formed on a substrate; and

a micro-lens formed from a micro-lens layer, the at least one mesa being embedded within the micro-lens layer;

wherein:

a shape of the micro-lens is curved, and a bottom of the microlens is lower than or equal to a top of the at least one mesa;

material of the micro-lens layer is different from material of the at least one mesa; and

the micro-lens layer is in direct physical contact with the at least one mesa.

2. The light emitting pixel unit according to claim 1, wherein the micro-lens forms individually around the top of the at least one mesa.

3. The light emitting pixel unit according to claim 1, wherein a spacer is formed from the same micro-lens layer between the at least one mesa and the micro-lens.

4. The light emitting pixel unit according to claims 3, wherein material of the spacer is as the same as material of the micro-lens.

5. The light emitting pixel unit according to claim 1, wherein the micro-lens is composed of a dielectric material.

6. The light emitting pixel unit according to claim 1, wherein material of the micro-lens is photoresist.

7. The light emitting pixel unit according to claim 1, wherein the height of the micro-lens is not more than 2 micrometers, and the width of the micro-lens is not more than 4 micrometers.

8. The light emitting pixel unit according to claim 1, wherein, on the substrate, the at least one mesa is within a matrix of mesa array, and the micro-lens is within a matrix of micro-lens array placed according to placement the mesa array.

9. The light emitting pixel unit according to claim 1, wherein the top of the at least one mesa is flat.

10. The light emitting pixel unit according to claim 1, wherein the at least one mesa includes at least a light emitting device.

11. A method of fabricating a light emitting pixel unit, comprising:

providing a substrate;

forming at least one mesa on the substrate; and

depositing a micro-lens material layer directly on at least a top of the at least one mesa by a depositing process, wherein the micro-lens material layer forms at least one micro-lens that is conformed to a shape of the at least one mesa and has a shape of hemisphere on the at least one mesa during the depositing process.

12. The method of fabricating a light emitting pixel unit according to claim 11, wherein the micro-lens material layer is deposited by a chemical vapor deposition technology.

13. The method of fabricating a light emitting pixel unit according to claim 12, further comprising: patterning the micro-lens material layer to expose an electrode area of the substrate.

14. The method of fabricating a light emitting pixel unit according to claim 13, wherein patterning further includes:

forming a mask on surface of the micro-lens material;

patterning the mask via a photolithography process, thereby forming openings in the mask and exposing the micro-lens material layer above the electrode area of the at least one mesa; and

with the mask protection in place, etching portions of the micro-lens material layer exposed by the openings.

15. The method of fabricating a light emitting pixel unit according to claim 14, wherein etching is a wet etching method.

16. A method of fabricating a light emitting pixel unit, comprising:

providing a substrate;

forming at least one mesa on the substrate;

forming a mark layer with one or more marks for aligning the at least one mesa to the micro-lens material layer in a patterning process;

after forming the mark layer, depositing a micro-lens material layer directly on at least a top of the at least one mesa, wherein the micro-lens material layer covers the top of the at least one mesa and top surface of the micro-lens material is flat; and

performing the patterning process including patterning the micro-lens material layer from top down, thereby forming at least a hemisphere in the micro-lens material layer aligned with the at least one mesa using the one or more marks, without passing through the micro-lens material layer, wherein the hemisphere is placed above the at least one mesa.

17. The method of fabricating a light emitting pixel unit according to claim 16, further including:

depositing a mask layer on the surface of the micro-lens material layer;

patterning the mask layer to form a hemisphere pattern in the mask layer; and

using the hemisphere pattern as a mask, etching the micro-lens material layer to form the hemisphere in the micro-lens material layer.

18. The method of fabricating a light emitting pixel unit according to claim 17, wherein, after the micro-lens material layer is etched, the micro-lens material layer is not etched through to expose top surface of the at least one mesa, thereby a spacer is formed on the top of the at least one mesa.

19. The method of fabricating a light emitting pixel unit according to claim 17, wherein the mask layer is patterned by a photolithography process firstly and then a reflowing process.