

OPTOELECTRONIC PROJECTION DEVICE

RELATED APPLICATIONS

[0001] This is a §371 of International Application No. PCT/DE2009/001694, with an international filing date of Nov. 27, 2009 (WO 2010/072191 A1, published Jul. 1, 2010), which is based on German Patent Application No. 10 2008 062 933.2 filed Dec. 23, 2008, the subject matter of which is incorporated by reference.

TECHNICAL FIELD

[0002] This disclosure relates to an optoelectronic projection device comprising a semiconductor body, which is an imaging element of the projection device.

BACKGROUND

[0003] WO 2008/060053 A1 discloses a device comprising an array of SiN-based LEDs arranged on a silicon substrate, wherein the LEDs are arranged in a two-dimensional regular matrix composed of n rows and m columns and are interconnected with one another. The LEDs each have a contact-connection on a front side and on a rear side, wherein the front side of the LEDs is in each case embodied as a radiation exit side. This disadvantageously results in shading effects at the radiation exit side of the LEDs which lead to an inhomogeneous emission characteristic of the LEDs.

[0004] An array of LEDs is furthermore described in WO 2001/097295 A2. Cylindrical LEDs arranged in a regular fashion are detached from an InGaN wafer. These LEDs are also electrically contact-connected from a front side and a rear side, thus disadvantageously resulting in shading effects and an associated inhomogeneous emission characteristic.

[0005] It could therefore be helpful to provide an optical projection device which is particularly space-saving and at the same time flexible in respect of how it can be used.

SUMMARY

[0006] An optoelectronic projection device which generates a predefined image during operation, comprising a semiconductor body having an active layer that generates electromagnetic radiation and a radiation exit side and is an imaging element of the projection device, wherein, to electrically contact the semiconductor body, a first contact layer and a second contact layer are arranged at a rear side of the semiconductor body, the rear side lying opposite the radiation exit side, and are electrically insulated from one another by a separating layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIGS. 1A to 1F in each case show a schematic cross section of an example of a projection device.

[0008] FIGS. 2A to 2C in each case show a schematic plan view of further example of a respective projection device.

[0009] FIG. 3 shows a schematic cross section of an example of an electronic component with a projection device arranged therein.

DETAILED DESCRIPTION

[0010] This object is achieved, inter alia, by means of an optoelectronic projection device comprising the features of

patent claim 1. The dependent claims relate to advantageous embodiments and preferred developments of the projection device.

[0011] We provide an optoelectronic projection device which generates a predefined image during operation. The projection device comprises a semiconductor body, which has an active layer suitable for generating electromagnetic radiation and a radiation exit side. The semiconductor body is an imaging element of the projection device. For making electrical contact with the semiconductor body, a first contact layer and a second contact layer are arranged at a rear side of the semiconductor body, the rear side lying opposite the radiation exit side, and are electrically insulated from one another by a separating layer.

[0012] The first and second contact layers arranged at the rear side of the semiconductor body advantageously prevent shading effects that can arise as a result of a contact layer arranged on the radiation exit side of the semiconductor body. Overall, the radiation efficiency of the semiconductor body and also the radiation homogeneity are improved as a result.

[0013] The semiconductor body is an imaging element of the projection device. In particular, the image generated by the projection device during operation is not generated by a further element such as, for example, a stencil, a transparency or a light modulator such as, for example, an LCD panel or a micromirror array, rather the semiconductor body itself is the imaging element. An optoelectronic projection device which is distinguished, in particular, by space-saving properties and at the same time is flexible in respect of how it can be used is advantageously made possible. In particular, a miniaturized projection device thus arises.

[0014] The semiconductor body is, for example, a light-emitting diode chip or a laser diode chip. The semiconductor body is preferably a thin-film semiconductor body. In the context of the application, a thin-film semiconductor body is considered to be a semiconductor body during whose production the growth substrate, onto which a semiconductor layer sequence comprising the semiconductor body was grown, for example epitaxially, has been stripped away.

[0015] The active layer of the semiconductor body preferably has a pn junction, a double heterostructure, a single quantum well (SQW) or a multi-quantum well structure (MQW) for generating radiation. In this case, the designation quantum well structure does not exhibit any significance with regard to the dimensionality of the quantization. It therefore encompasses, inter alia, quantum wells, quantum wires and quantum dots and any combination of these structures.

[0016] The semiconductor body has a radiation exit side, through which radiation generated in the semiconductor body can leave the semiconductor body. In this case, the radiation exit side is preferably formed by a main side of the semiconductor body. In particular, the radiation exit side is formed by that main side of the semiconductor body which lies opposite a mounting side of the semiconductor body. Preferably, no or hardly any light emerges through side areas of the semiconductor body.

[0017] Preferably, the optoelectronic projection device generates a predefined image during operation. In particular, during the operation of the projection device, the latter generates an image which is predefined and hence predetermined. The image can be imaged onto a projection area, for example.

[0018] The semiconductor body is provided for emitting electromagnetic radiation from the radiation exit side. A first