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NAPIERALA et al.

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(54) **OPTOELECTRONIC DEVICE AND MANUFACTURING METHOD THEREOF**

(71) Applicant: **ALEDIA**, Echirolles (FR)

(72) Inventors: **Jérôme NAPIERALA**, Saint Egreve (FR); **Florian DUPONT**, Grenoble (FR)

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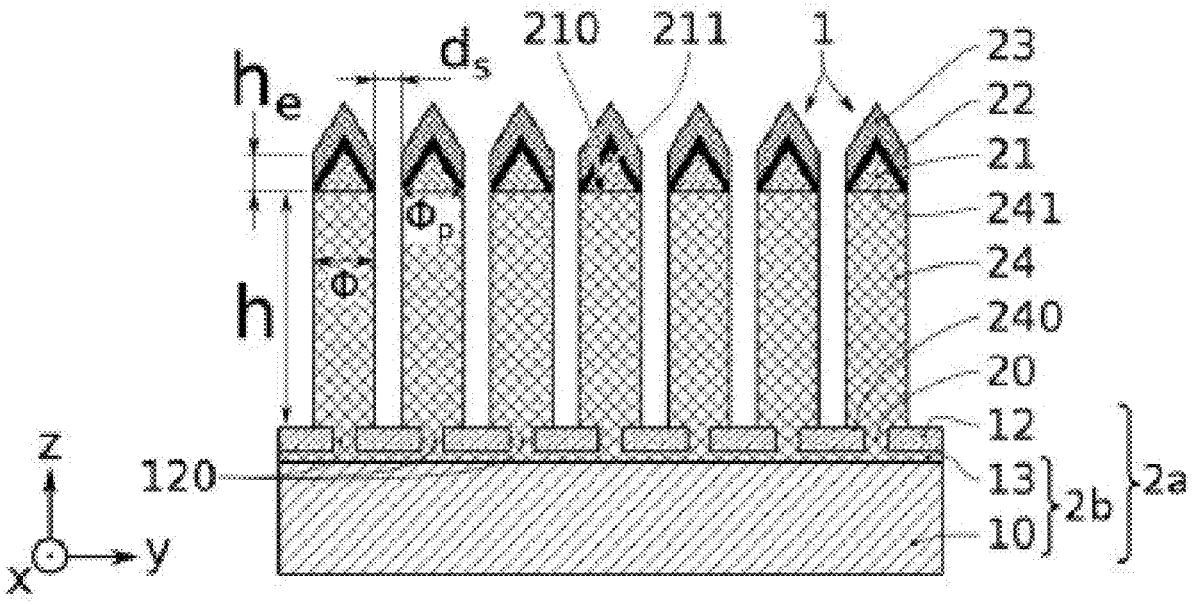
(57) **ABSTRACT**

A three-dimensional (3D) structure for optoelectronics including a pyramid made of a first InGaN-based material formed from a substrate, wherein the 3D structure includes a wire made of a second GaN-based material, different from the first material, the wire extending in a longitudinal direction perpendicular to the plane of the substrate between the substrate and a base of the InGaN-based pyramid, so that the 3D structure has the general shape of a pencil. One or more embodiments of the invention also relates to a method for manufacturing such a 3D structure, and an optoelectronic device based on a plurality of these 3D structures.