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**WO 2004/109764 A3**

(54) Title: METHOD OF FABRICATING VERTICAL STRUCTURE COMPOUND SEMICONDUCTOR DEVICES

(57) Abstract: A method of fabricating a vertical structure opto-electronic device includes fabricating a plurality of vertical structure opto-electronic devices on a crystal substrate, and then removing the substrate using a laser lift-off process. The method then fabricates a metal support structure in place of the substrate. In one aspect, the step of fabricating a metal support structure in place of the substrate includes the step of plating the metal support structure using at least one of electroplating and electro-less plating. In one aspect, the vertical structure is a GaN-based vertical structure, the crystal substrate includes sapphire and the metal support structure includes copper. Advantages of the invention include fabricating vertical structure LEDs suitable for mass production with high reliability and high yield.

# INTERNATIONAL SEARCH REPORT

International application No.

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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC: H01L 21/00( 2006.01),27/15( 2006.01),29/26( 2006.01),31/12( 2006.01),33/00( 2006.01)

USPC: 438/22,26;257/79,103

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 438/22,26;257/79,103

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST Search: USPGPUB, USPAT, EPO, JPO

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 6,562,648 B1 (WONG et al) 13 May 2003 (13.05.2003), column 4, line 47 - column 5, line 56.	1, 3, 5, 7, 13, 14, 18, 19, 21
Y	US 6,455,340 B1 (CHUA et al) 24 Sep. 2002 (24.09.2002), column 7, lines 65-67.	2, 4, 6, 8, 20 2, 4, 6, 8, 20

Further documents are listed in the continuation of Box C.

See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

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