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(54) **Title**: METHOD AND APPARATUS FOR SUPER RADIANT LASER ACTION IN HALF WAVELENGTH THICK ORGANIC SEMICONDUCTOR MICROCAVITIES

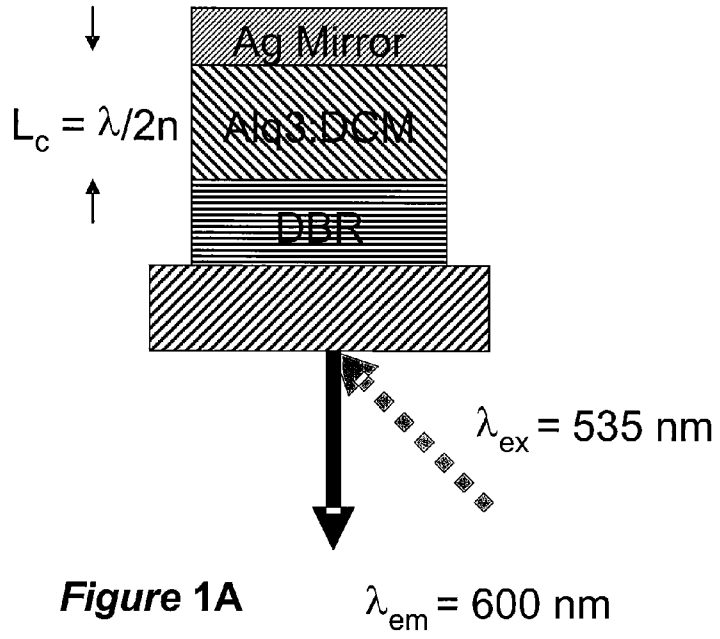

Figure 1A

(57) **Abstract**: The disclosed device is a solid state organic semiconductor VCSEL in which the microcavity is composed of metal and dielectric mirrors and the gain layer is only λ/2n thick. The gain layer comprises a thermally evaporated 156.7 nm thick film of the laser dye DCM doped (2.5 % v/v) into an AIq3 host matrix. The microcavity consists of 2 mirrors, a dielectric Bragg reflector (DBR) sputter-coated onto a quartz substrate as the mirror through which the organic gain layer is optically excited and laser emission is collected and a silver mirror that is thermally evaporated on top of the AIq3)DCM film. The device exhibits laser action from the DCM both when the DCM molecules are excited directly at 535 nm and via Fδrster Resonance Energy Transfer (FRET) from the AIq3 (excited at 404 nm) with laser thresholds of 4.9 μj/cm^2 and 14.2 μj/cm^2 respectively.

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A. CLASSIFICATION OF SUBJECT MATTER

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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)

H01S 3/08; H01S 3/05; H01S 3/091; H01S 3/092; H01S 3/14; H01S 3/16

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

Korean utility models and applications for utility models
Japanese utility models and applications for utility models
(Chinese Patents and application for patent)

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

eKOMPASS(KIPO internal) & Keywords: DBR, VCSEL, laser, microcavity, mirror, organic, semiconductor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6160828 A1 (VLADIMIR KOZLOV et al.) 12 December 2000 See column 3, line 35 - column 7, line 35.	1-19
A	US 6498802 B1 (HYE-YONG CHU et al.) 24 December 2002 See column 1, line 23 - column 3, line 54.	1-19
A	US 2004/0004988 A1 (RONALD S. COK et al.) 8 January 2004 See paragraph 33 - paragraph 42 and abstract.	1-19

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

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