

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing
(day/month/year)

Applicant's or agent's file reference
WN-3091P

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/JP2007/071159

International filing date (day/month/year)
24.10.2007

Priority date (day/month/year)
22.11.2006

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

Applicant
NEC Corporation

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

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Box No. I	Basis of this opinion
1.	<p>With regard to the language, this opinion has been established on the basis of:</p> <p><input checked="" type="checkbox"/> the international application in the language in which it was filed</p> <p><input type="checkbox"/> a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).</p>
2.	<p><input type="checkbox"/> This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))</p>
3.	<p>With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:</p> <p>a. type of material</p> <p><input type="checkbox"/> a sequence listing</p> <p><input type="checkbox"/> table(s) related to the sequence listing</p> <p>b. format of material</p> <p><input type="checkbox"/> on paper</p> <p><input type="checkbox"/> in electronic form</p> <p>c. time of filing/furnishing</p> <p><input type="checkbox"/> contained in the international application as filed</p> <p><input type="checkbox"/> filed together with the international application in electronic form</p> <p><input type="checkbox"/> furnished subsequently to this Authority for the purposes of search</p>
4.	<p><input type="checkbox"/> In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.</p>
5.	<p>Additional comments:</p>

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	10-23	YES
	Claims	1-9	NO
Inventive step (IS)	Claims		YES
	Claims	1-23	NO
Industrial applicability (IA)	Claims	1-23	YES
	Claims		NO
2. Citations and explanations:			
Document 1:	WO 2005/083751 A2 (University of Florida), 09 September 2005, claims 1-2, 7, 9-12, paragraphs [0010]-[0011], [0024], [0026]-[0027], [0035]-[0042] fig. 1		
Document 2:	JP 2006-294667 A (Toray Industries, Inc.), 26 October 2006, abstract, claims 1-5, paragraphs [0021]-[0022], [0027]-[0028], [0037]-[0041], fig. 2		
Document 3:	JP 11-505367 A (Robert Bosch GmbH), 18 May 1999, abstract, fig. 1		
Document 4:	JP 2006-190815 A (NEC Corp.), 20 July 2006, entire text, all drawings		
Document 5:	JP 2004-311733 A (Japan Science and Technology Agency), 04 November 2004, abstract, claims 1-11, paragraphs [0004]-[0008], mode for carrying out the invention, all drawings		
Document 6:	WO 2004/009884 A1 (University Florida), 29 January 2004, entire text, all drawings		
Document 7:	DERYCKE, V. <i>et al.</i> , "Controlling doping and carrier injection in carbon nanotube transistors," Applied Physics Letters, 15 April 2002 (2002.04.15), Vol. 80, No. 15,		

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
	<p>pages 2773-2775</p> <p>Document 8: JP 2005-209736 A (Japan Science and Technology Agency), 04 August 2005, abstract, claims 1-6, paragraphs [0030]-[0032], [0043]</p> <p>Document 9: JP 2005-209736 A (Japan Science and Technology Agency), 04 August 2005, abstract, claims 1-6, paragraphs [0030]-[0032], [0043]</p> <p>Document 10: JP 2002-305087 A (Sony Corp.), 18 October 2002, abstract, claim 1, paragraphs [0016], [0019], [0023], fig. 1</p> <p><Claims 1-9></p> <p>The invention as in claims 1-9 lacks novelty in the light of document 1 cited in the ISR. Document 1 (claims 1-2, 7, paragraphs [0010]-[0011], [0024], [0026]-[0027], [0035]-[0042], fig. 1) discloses a semiconductor device characterized by having a structure in which a luminescent layer is sandwiched between an anode and a cathode, at least one of either the anode or cathode comprises a single-wall carbon nanotube, the single-wall carbon nanotube includes a halogen or alkali metal, and the luminescent layer effects electroluminescence. It is also found that, in the examples, the electrode consisting of the single-wall carbon nanotube serves as the anode, but as paragraph [0042] describes the applicability to contact with an n-type layer, the use of the electrode as the cathode is also suggested.</p> <p><Claims 10-11></p> <p>The invention as in claim 10 does not involve an inventive step in the light of document 1 and document 2</p>

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

cited in the ISR. As exemplified in document 2, a person skilled in the art could easily conceive of using an anode or cathode consisting of a carbon nanotube as the source electrode or drain electrode of a thin-film transistor.

The invention as in claim 11 does not involve an inventive step in the light of document 1 and document 3 cited in the ISR. Although document 1 does not disclose applications to organic EL elements, a person skilled in the art could easily conceive of applying to an organic EL element in which the carbon nanotube set forth in document 3 is used as the anode or cathode.

<Claims 12-23>

The invention as in claims 12-23 does not involve an inventive step in the light of documents 1-8 cited in the ISR. Various methods for doping carbon nanotubes are known, as exemplified in documents 4-7, and coating and printing methods are known for the production of carbon nanotube films, as exemplified in documents 2 and 8. A person skilled in the art could easily conceive of using such methods to produce the semiconductor devices set forth in document 1 or 3.

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Box No. VI	Certain documents cited			
1. Certain published documents (Rule 43bis.1 and 70.10)				
	Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
	WO 2007/015710 A2	08.02.2007	09.11.2005	09.11.2004
	"E, X"			
2. Non-written disclosures (Rule 43bis.1 and 70.9)				
	Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)	