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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

— *of inventorship (Rule 4.17(iv))*

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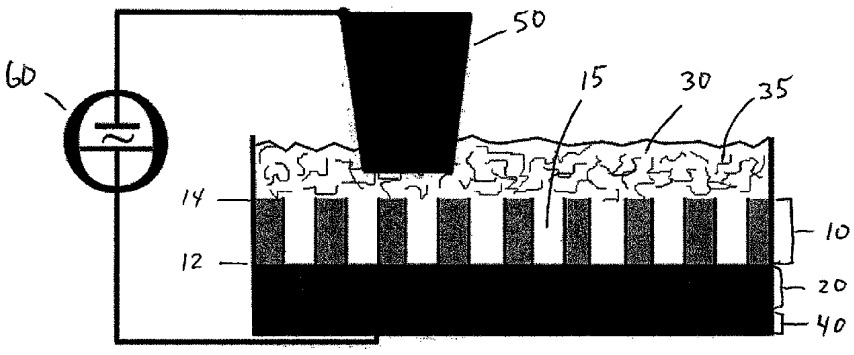
(54) Title: LARGE SCALE NANOELEMENT ASSEMBLY METHOD FOR MAKING NANOSCALE CIRCUIT INTERCONNECTS AND DIODES

Fig. 1



(57) Abstract: Nanoelements such as single walled carbon nanotubes are assembled in three dimensions into a nanoscale template on a substrate by means of electrophoresis and dielectrophoresis at ambient temperature. The current-voltage relation indicates that strong substrate-nanotube interconnects carrying mA currents are established inside the template pores. The method is suitable for large-scale, rapid, three-dimensional assembly of 1,000,000 nanotubes per square centimeter area using mild conditions. Circuit interconnects made by the method can be used for nanoscale electronics applications.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 09/40346

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C23C 16/00, B05D 1/32 (2009.01)
USPC - 427/249.1, 427/180, 427/255.11
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)
IPC(8) - C23C 16/00, B05D 1/32 (2009.01)
USPC - 427/249.1, 427/180, 427/255.11

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 427/249.1, 427/180, 427/255.11 (keyword-limited:see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Google, Google Scholar, Google Patents, PUBWEST (PGPB, USPT, USOC, EPAB, JPAB)
Search Terms Used: Carbon, nanotube, silicon, heterojunction, nanoporous, alumina, template, diode, interconnect, current density, electrophoresis, deposition, vertical, cathode, anode, solvent, ethanol, pn, schottky, junction, single, walled.

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 2006/0103287 A1 (TSUEI) 18 May 2006 (18.05.2006), Abstract, para [0018] - para [0020], para [0022], Figure 5	1-3, 6, 8, 12 ---------- 4, 5, 7, 9-11, 13, 14
X ---- Y	TZOLOV et al., "Carbon Nanotube-Silicon Heterojunction Arrays and Infrared Photocurrent Responses." J. Phys. Chem. C, 2007, 111, 5800-5804, 05 July 2007 (05.07.2007), Abstract, Pg 5801, section 2, para 1, para 2, Figure 2	15, 16, 18, 20, 21, 24, 26-28 ---------- 17, 19, 22, 23, 25
Y	ZHAO et al., "Electrophoretic deposition and field emission properties of patterned carbon nanotubes." Applied Surface Science 251 (2005) 242-244, 15 September 2005 (15.09.2005) Pg 243, section 3, para 3	4, 7, 11, 19
Y	US 6,673,717 B1 (BROUSSEAU et al.) 06 January 2004 (06.01.2004), col 9, ln 41-53	5
Y	GULTEPE et al. "High through-put assembly of nanoelements in nanoporous alumina templates." APPLIED PHYSICS LETTERS 90, 163119, 20 April 2007 (20.04.2007), Pg 163119-2, Figure 2, para 2, Figure 3, Pg 163119-3, para 2	9, 10, 13, 14, 22, 25
Y	TZOLOV et al. "Electronic Transport in a Controllably Grown Carbon Nanotube-Silicon Heterojunction Array." PHYSICAL REVIEW LETTERS, VOL. 92, NUMBER 7, 20 February 2004 (20.02.2004), Abstract, Figure 1, Figure 3a	17
Y	US 6,958,216 B2 (KELLEY et al.) 25 October 2005 (25.10.2005), col 3, ln 1 - ln 20	23

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"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

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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