

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 08 MAR 2005			
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To:
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing (day/month/year)	03 MAR 2005
FOR FURTHER ACTION See paragraph 2 below	

Applicant's or agent's file reference
40-002530PC

International application No. PCT/US04/14006	International filing date (day/month/year) '05 May 2004 (05.05.2004)	Priority date (day/month/year) 05 May 2003 (05.05.2003)
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International Patent Classification (IPC) or both national classification and IPC
IPC(7): B32B 5/16; D04H 3/00, 5/00, 13/00 and US Cl.: 428/221,292.1,323,332; 442/327,330,334,361,376,394,400,401,402,417

Applicant
NANOSYS, INC.

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/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Terrel Morris Telephone No. 571-272-1700
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J. Whitehead
Fan

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US04/14006

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. 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:

a. type of material

a sequence listing

table(s) related to the sequence listing

b. format of material

in written format

in computer readable form

c. time of filing/furnishing

contained in international application as filed.

filed together with the international application in computer readable form.

furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table 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.

4. Additional comments:

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Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- paid additional fees
 - paid additional fees under protest
 - not paid additional fees
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- complied with
 - not complied with for the following reasons:
See the lack of unity section of the International Search Report(Form PCT/ISA/210)

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- all parts.
 - the parts relating to claims Nos. 1-25, 83, 93-94, 97-99, 192, and 199-200 (GROUP 1)

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

1. Statement

Novelty (N)	Claims <u>NONE</u>	YES
	Claims <u>1-25, 83, 93-94, 97-99, 192, and 199-200</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-25, 83, 93-94, 97-99, 192, AND 199-200</u>	NO
Industrial applicability (IA)	Claims <u>1-25, 83, 93-94, 97-99, 192, AND 199-200</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Please See Continuation Sheet

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-25, 83, 93-94, 97-99, 192, and 199-200 lack novelty under PCT Article 33(2) as being anticipated by Webster et al. (US PG Pub 2003/0059742).

Webster et al. disclose an orthopedic/dental implant comprising mineral nanofibers wherein the nanofibers have a diameter of from about 0.1 to about 100 nm (Abstract). The mineral nanofibers are selected from the group consisting of alumina, titania, zirconia, hafnia, cobalt-chromium, barium aluminate, barium titanate, iron oxide, and zinc oxide nanofibers, or combinations thereof (Abstract). The composition of the nanofibers may in turn comprise a combination of polymer and mineral (para. 26-27). Functional groups may be added to the surface of the nanofibers to improve osteoblast adhesion (para. 34).

Claims 1-25, 93-94, and 97-99 lack novelty under PCT Article 33(2) as being anticipated by Tennent et al. (US Patent 6,099,965).

Tennent et al. disclose a rigid porous carbon structure comprising nanofibers (Abstract). The nanofibers may be caused to form bonds with one another following their chemical modification (Abstract). One embodiment of the invention has the nanofibers incorporated in an aerogel composite, and other include their use as filter media, catalyst supports, filters, adsorbents, electroactive materials and as chromatography media (col. 4, lines 58-67). The carbon species associated with the applied patent include fibrils, whiskers, nanotubes, buckytubes, etc. (col. 6, lines 37-40). One preferred embodiment of the applied invention comprises carbon species having diameters in the range of 3.5-70nm (col. 6, lines 48-51). The nanofibers may be oxidized, which functionalizes the surface of the nanofibers (col. 7, line 66 - col. 8, line 2). Particulate solids such as MnO₂ (for batteries) and Al₂O₃ (for high temperature gaskets) may be added to the nanofiber dispersion prior to mat formation at up to 50 parts added solids per part of fibrils (col. 14, lines 30-34). In the Wacker Process, a catalyst-loaded carbon nanofiber structure is prepared by absorbing a catalyst, such as palladium chloride, copper chloride, potassium chloride or lithium chloride, in a solvent such as water, into dry carbon nanofiber structures (col. 22, lines 28-31).

Claims 1-25, 93-94, and 97-99 lack novelty under PCT Article 33(2) as being anticipated by Gillingham et al. (US PG Pub 2002/0092423).

Gillingham et al. disclose a method of cleaning an air intake for a glass turbine system utilizing a filter comprising fine fibers (Abstract). The filter media includes at least a micro- or nanofiber web layer in combination with a substrate material in a mechanically stable filter structure (para. 9). The invention provides an improved polymeric material. This polymer has improved physical and chemical stability. The polymer fine fiber (microfiber and nanofiber) can be fashioned into useful product formats. Nanofiber is a fiber with diameter less than 200 nanometer or 0.2 micron (para. 19). The filter products comprising a fine fiber layer and a cellulosic layer are thin with a choice of appropriate substrate (para. 19). A preferred mode of the invention is a polymer blend comprising a first polymer and a second, but different polymer (differing in polymer type, molecular weight or physical property) that is conditioned or treated at elevated temperature (para. 21). Preferred materials for use in the blended polymeric systems include nylon 6; nylon 66; nylon 6-10; nylon (6-66-610) copolymers and other linear generally aliphatic nylon compositions (para. 21). Another preferred mode of the invention involves a single polymeric material combined with an additive composition to improve fiber

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

lifetime or operational properties. The preferred polymers useful in this aspect of the invention include nylon polymers, polyvinylidene chloride polymers, polyvinylidene fluoride polymers, polyvinylalcohol polymers and, in particular, those listed materials when combined with strongly oleophobic and hydrophobic additives that can result in a microfiber or nanofiber with the additive materials formed in a coating on the fine fiber surface. Again, blends of similar polymers such as a blend of similar nylons, similar polyvinylchloride polymers, blends of polyvinylidene chloride polymers are useful in this invention. Further, polymeric blends or alloys of differing polymers are also contemplated by the invention. In this regard, compatible mixtures of polymers are useful in forming the microfiber materials of the invention. Additive composition such a fluoro-surfactant, a nonionic surfactant, low molecular weight resins (e.g.) tertiary butylphenol resin having a molecular weight of less than about 3000 can be used (para. 24). A particularly preferred material of the invention comprises a microfiber material having a dimension of about 0.0001 to 5 microns (para. 25).

Claims 1-25, 93-94, and 97-99 lack novelty under PCT Article 33(2) as being anticipated by Massey et al. (US Patent 6,362,011).

Massey et al. disclose the use of graphitic nanotubes as solid supports in electrogenerated chemiluminescence assays (Abstract). The graphitic nanotubes are chemically modified with functional group biomolecules prior to use in an assay (Abstract). Association of electrochemiluminescent ruthenium complexes with the functional group biomolecule-modified nanotubes permits detection of molecules including nucleic acids, antigens, enzymes, and enzyme substrates by multiple formats (Abstract). The applied invention comprises a graphitic nanotube having a functional group attached thereto and an assay-performance-substance being capable of binding, directly or indirectly to the desired analyte (col. 7, lines 45-60).

Functional groups are introduced onto the surface of carbon fibrils by contacting carbon fibrils with a strong oxidizing agent for a period of time sufficient to oxidize the surface of said fibrils and further contacting said fibrils with a reactant suitable for adding a functional group to the oxidized surface. Preferably, the oxidizing agent is comprised of a solution of an alkali metal chlorate in a strong acid. In other embodiments the alkali metal chlorate is sodium chlorate or potassium chlorate. In preferred embodiments the strong acid used is sulfuric acid. Periods of time sufficient for oxidation are from about 0.5 hours to about 24 hours (col. 11, lines 42-54).

Typical analytes of interest are a whole cell or surface antigen, subcellular particle, virus, prion, viroid, antibody, antigen, hapten, fatty acid, nucleic acid, protein, lipoprotein, polysaccharide, lipopolysaccharide, glycoprotein, peptide, polypeptide, cellular metabolite, hormone, pharmacological agent, synthetic organic molecule, organometallic molecule, tranquilizer, barbiturate, alkaloid, steroid, vitamin, amino acid, sugar, lectin, recombinant or derived protein, biotin, avidin, streptavidin, or inorganic molecule present in the sample. Typically, the analyte of interest is present at a concentration of 10^{-3} molar or less, for example, as low as 10^{-12} molar or lower (col. 16, lines 14-25).

Nanotubes primarily consist of chemically-modifiable graphitic carbon. They generally have diameters no greater than 0.1 microns and length to diameter ratios of at least 5. Typically, they have diameters of 0.01 microns and lengths of 1-10 microns (col. 18, lines 23-28).

Claims 1-25, 93-94, and 97-99 lack novelty under PCT Article 33(2) as being anticipated by Gao et al. (US Patent 6,361,861).

Gao et al. disclose carbon nanotubes whose hollow cores have been filled with conductive filler (Abstract). The carbon nanotubes are in uniform arrays on a conductive substrate and are aligned (Abstract). The diameter of the nanofibers can be dictated by the size of the catalyst particles on the conductive substrate (Abstract). The conductive filler may also be made up of carbon and whichever metal makes up the conductive substrate, which includes but is not limited to transition elements appearing in groups IIIB, IVB, VIB, VIIB, VII, and IB of the periodic table. Preferred metals are titanium, vanadium, tantalum, and combinations thereof (col. 4, lines 20-25). The carbon nanotubes have lengths ranging from about 1 to 2 .mu.m, varying no more than about 5%, which provides uniform lengths. The carbon nanotubes also have uniform diameters such that their diameters vary no more than about 5%. The outside nanotube diameter ranges from less than 40 to about 400 nm and the inside nanotube diameter ranges from about 10 to about 100 nm. The diameters of the carbon nanotubes and filled cores can be controlled by varying the thickness of the catalyst (iron) layer. In general, the thicker the iron catalyst layer, the bigger the tube diameter. However, when the tube diameter is less than 40 nm, the carbon nanotubes are curved and only partially filled (col. 4, lines 32-45).