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Patenting Systems, Patentable Subject Matter, and Prior Art

Dannie Jost

International School of Solid State Physics

Materials for Renewable Energy

July 18-28, 2012

Ettore Majorana Foundation and Centre for Scientific Culture

u b
b UNIVERSITÄT BERN

Survey

Now

1. How many of you have applied for a patent?
2. How many of you have ever been granted a patent? Where?
3. How many of you have ever earned revenue from a patent?

Future

1. How many of you want to apply for a patent?
2. How many of you want to earn revenue from patents?

Outline

- I – The Role of Patents in Technology Transfer and Research
- II – Patents and Intellectual Property: from Venice to Paris on the way to Uruguay
- III – Patents: Bibliographic Data, Description, and Claims
- IV – Prior Art, Science, Internet and Open Access

What is a patent?

- State granted monopoly rights for 20 years on an invention in return for disclosing the invention completely.
  - A right to exclude third parties from exploiting the invention commercially.
  - Publication that contains detailed technical information.

Patents provide the patent owner with the legal means to prevent others from making, using, or selling the new invention for a limited period of time, subject to a number of exceptions.

I – The Role of Patents in Technology Transfer and Research

Patents and clean energy: bridging the gap between evidence and policy: Final report (2010)

"The role of intellectual property rights (IPRs) in the transfer of climate change technologies has emerged as a particularly contentious issue in the past two years. Against this background, the United Nations Environment Programme (UNEP), the European Patent Office (EPO) and the International Centre for Trade and Sustainable Development (ICTSD) joined forces to undertake an empirical study on the role of patents in the transfer of clean energy technologies (CETs)."

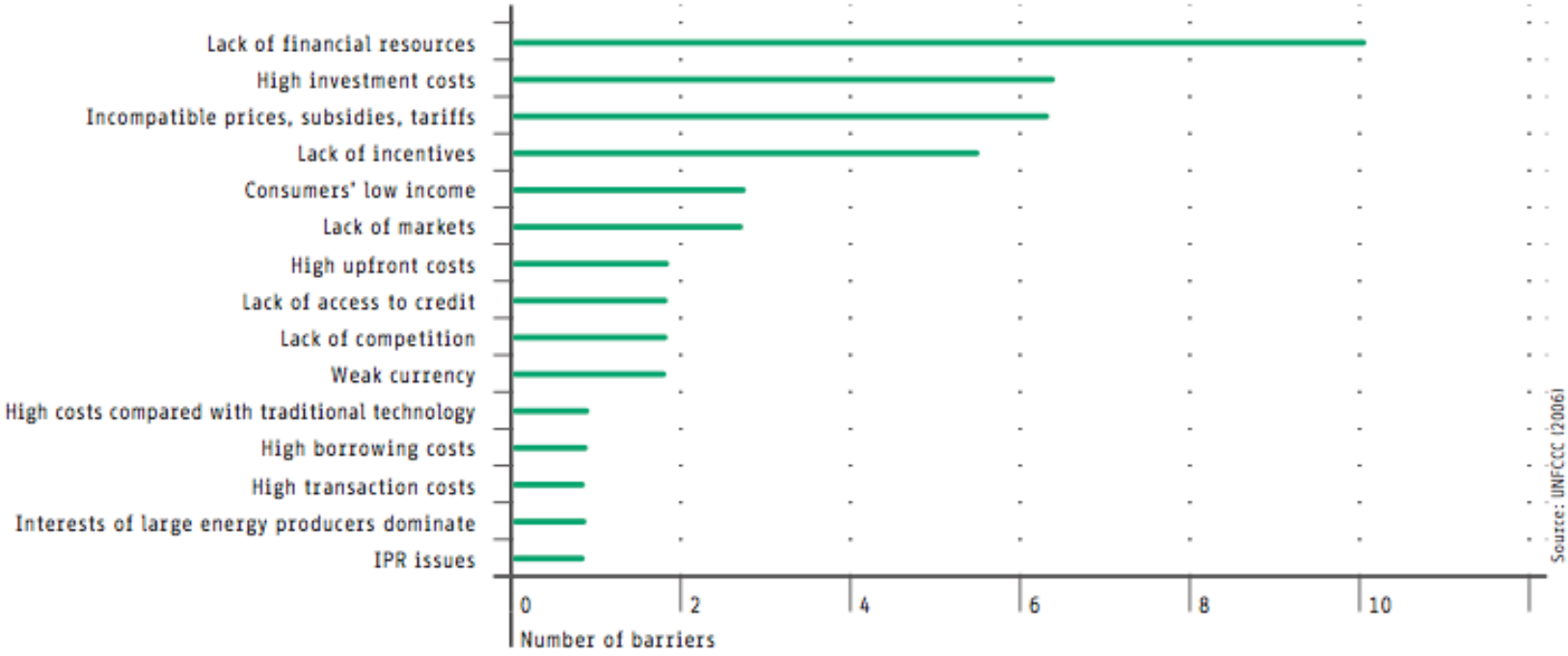
Editors and contributors: Konstantinos Karachalios, Nikolaus Thumm (EPO); Ahmed Abdel Latif, Pedro Roffe (ICTSD); Benjamin Simmons (UNEP); Tahir Amin (Initiative for Medicines, Access and Knowledge (I-MAK)) (download)

. . .

"Unsurprisingly, and in line with the most general trends, most of the evidence to date on whether IPRs, in particular patents, will impact technology transfer to developing countries remains inconclusive."

Patents and Clean Energy: Bridging the Gap Between Evidence and Policy Final Report, 2010. at 23.

02 Economic and market barriers to technology transfer*



* By UNFCCC Non-Annex I parties

Why are patents important?

- Competitive element for advanced technologies
  - If you are an industrial start-up in an advanced technology, asserting yourself in the market will require a patent portfolio.
- Provide information on the state of the art
  - If you are a researcher, you need to know what the industry is doing and patenting.

INTELLECTUAL PROPERTY RIGHTS (IPR)

- Objects
  - Patents (TRIPS 1994; EPC 1973, PCT 1970)
  - Trademarks
  - Copyright
  - Designs
  - Integrated Circuits (Washington Treaty, 1989)
  - Geographical Indications
  - Trade Secrets
  - Traditional Knowledge

II – Patents and Intellectual Property: from Venice to Paris on the way to Uruguay

Photo: mprove

… the Republic of Florence issued a patent in 1421 to the eminent architect and inventor, Filippo Brunelleschi, for his ship, which was designed to transport Carraran marble for his famous Duomo of Florence.

However the ship sunk, and with it the (first) Florentine patent system.

Venice, 1474

"The Venetian Republic, on March 19, 1474, enacted the first known general patent statute, with overwhelming support in the Venetian legislature[39]. This statute, which sought to encourage technological advancement by issuing private grants and importation licenses, established a foundation for the world's first patent system, leading one historian to proclaim that 'the international patent experience of nearly 500 years has merely brought amendments or improvements upon the solid core established in Renaissance Venice' "

Nard, Craig A, and Morriss, Andrew P. "Constitutionalizing Patents: From Venice to Philadelphia." *Review of Law & Economics* 2, no. 2 (2006): 223-321.

Venice, 1474

We have among us men of great genius, apt to invent and discover ingenious devices; and in view of the grandeur and virtue of our City, more such men come to us every day from divers parts.

preamble

Statute of Monopolies, 1624

… any Declaration before-mentioned shall not extend to any Letters Patents and Grants of Privilege for the Term of fourteen Years or under, hereafter to be made, of the sole Working or Making of any manner of new Manufactures within this Realm, to the true and first Inventor and Inventors of such Manufactures, which others at the Time of Making such Letters Patents and Grants shall not use, so as also they be not contrary to the Law, nor mischievous to the State, by raising Prices of Commodities at home, or Hurt of Trade, or generally inconvenient ...

US Constitution, 1787

Sec. 8

The Congress shall have Power …

To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries;

→ First Congress, Patent Act, 1790

1883

- Paris Convention for the Protection of Industrial Property
- 174 Parties (Member States)
- Article 4: [A to I. Patents, Utility Models, Industrial Designs, Marks, Inventors' Certificates: Right of Priority G. Division of the Application

Fast Forward…

- 1947 GATT (1993) General Agreement on Tariffs and Trade
- 1994 GATT
- 1995 WTO World Trade Organization
  - Uruguay Round 1986-1994
  - Trade Related Aspects of Intellectual Property Rights

TRIPS Article 27*

Patentable Subject Matter

1. Subject to the provisions of paragraphs 2 and 3, patents shall be available for any **inventions**, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.(5) Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.

* As of 10 May 2012, the WTO counted 155 Member States

. . .

Possible Exclusions I

2. Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law.

. . .

Optional Exclusions II

3. Members may also exclude from patentability:

(a) diagnostic, therapeutic and surgical methods for the treatment of humans or animals;

(b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement.

What can be patented?

- patents shall be available for any **inventions**, whether products or processes, in all fields of technology
  - Invention
  - Products or Processes
  - Technology

AND

- New
  - Novelty
- Inventive Step
  - State of the Art; non-obvious
- Industrial Application
  - Useful

EPC Article 52(1)

(1) European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step.

What is an invention?

EPC Article 52(2) recites what is not regarded as an invention:

(a) discoveries, scientific theories and mathematical methods;

(b) aesthetic creations;

(c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;

(d) presentation of information.

ZA Patents Act No. 57 of 1978 (as last amended by Act No. 49 of 1996)

Sec. 25.-(1) A patent may, subject to the provisions of this section, be granted for any new invention which involves an inventive step and which is capable of being used or applied in trade or industry or agriculture.

(2) Anything which consists of-

(a) a discovery;

(b) a scientific theory;

(c) a mathematical method;

ZA Patents Act No. 57 of 1978

...

(d) a literary, dramatic, musical or artistic work or any other aesthetic creation;

(e) a scheme, rule or method for performing a mental act, playing a game or doing business;

(f) a program for a computer; or

(g) the presentation of information,

shall not be an invention for the purposes of this Act.

35 USC § 101

Inventions Patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

35 USC §102

Conditions for patentability; novelty and loss of right to patent.

A person shall be entitled to a patent unless —

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

. . .

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by applicant for patent, or

. . .

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

(Amended July 28, 1972, Public Law 92–358, sec. 2, 86 Stat. 501; Nov. 14, 1975, Public Law 94–131, sec. 3, 89 Stat. 691.)

Bui (2011)
93 J. Pat. & Trademark Off. Soc'y 441

- Moving the U.S. from a “first-to-invent” system to “first-to-file” system with a limited one-year grace period only for an inventor's own prior publication and inventor-derived public disclosure; [Patent Reform Act of 2011, H.R. 1249, 112th Cong. §3 (2011)]
- Eliminating “interference proceedings” and replacing therewith “derivation proceedings” to ensure first to file is actually an original inventor and not derived from another; [*Id.* §3]
- Eliminating best mode failure as a litigation defense; [*Id.* §15]
- Prohibiting the issuance of patents claiming “any strategy for reducing, avoiding or deferring tax liability” [*Id.* §14] and “human organisms;” [*Id.* §33]

Bui (2011)
93 J. Pat. & Trademark Off. Soc'y 441

- Eliminating the incentive to sue for false patent marking [*Id.* §16] and to join multiple defendants in a single lawsuit; [*Id.* §19]
- Codifying existing regulations for 3rd party submission of prior art in published applications and expanding time period for 3rd party submission of prior art; [*Id.* §8]
- Expanding prior user rights as a defense to infringement to all technologies (not just business method claims); [*Id.* §5]
- Creating new USPTO proceedings for Post-Grant Review [*Id.* §6, Chapter 31] and *Inter Partes* Review [*Id.* §6, Chapter 32] (where any person can challenge the validity of a patent within the USPTO with limited discovery) and Supplemental Examination [*Id.* §12] (where a patent owner can correct problems with a patent and strengthen the value of the patent in anticipation of litigation); and
- Creating a new Patent Trial & Appeal Board [*Id.* §7] to replace "Board of Patent Appeals and Interferences" to handle, among others, new Post-Grant Review and *Inter Partes* Review.

Invention v Discovery

- Patents specify applications of the laws of nature, and shall not claim the laws of nature as such.
- Invention provides solutions to technical problems, and it may or may not involve a sophisticated application of the laws of nature.
- Discovery involves the acquisition of (new) information and knowledge.

Can you get a patent for a chemical element?

United States Patent Office

3,161,462

Patented Dec. 15, 1964

3,161,462

ELEMENT 96 AND COMPOSITIONS THEREOF

Glen T. Seaborg, Berkeley, Calif., assignor to the United States of America as represented by the United States Atomic Energy Commission

No Drawing. Filed Feb. 7, 1949, Ser. No. 75,064
17 Claims. (Cl. 23—14.5)

This invention relates to a new transuranic element. more specifically, it relates to the transuranic element having atomic number 96, to isotopes thereof, to compositions containing the same, and to methods of producing and purifying said elements and compositions thereof.

The expression "element 96," when used throughout this specification and claims, designates the element having atomic number 96, also known as curium, having the symbol Cm. The expression "element 95," when used throughout this specification and claims, designates the element having atomic number 95, also known as americium, having the symbol Am. Reference herein to an element is to be understood as denoting the element generically in its free state or in the form of a compound unless otherwise indicated by the context.

The term "actinide group of the heavy metals," as used in this specification and claims, refers to the transition elements having atomic numbers 90 to 96, inclusive.

It is an object of this invention to provide a novel element, curium, isotopes and compositions thereof.

An additional object of this invention is to provide methods of producing curium, isotopes and compositions thereof.

A further object of this invention is to provide methods of separating curium and compositions thereof, from other elements and compositions.

Additional objects of the presesnt invention will be evident from the following description.

In accordance with the present invention, two isotopes of curium have been synthesized in identifiable quantities, i.e., $_{96}Cm^{240}$ and $_{96}Cm^{242}$. The former isotope is an emitter of alpha particles having a range in air of 4.95 ±0.1 cm. (energy 6.3 mev.) and decays with a half-life of 26.8±0.3 days. The latter is also an emitter of alpha particles which have a range in air of 4.75±0.1 cm. (energy 6.1 mev.) and decays with a half-life of 5.0 ±0.1 months.

It has been found that these isotopes of element 96 may be synthesized by the bombardment of certain heavy metal isotopes of the actinide rare earth group with nuclear particles. For the purpose of this discussion the synthesis may be divided into two general methods: (*a*) the bombardment of isotopes of the actinide group of heavy metals with charged nuclear particles, and (*b*) the bombardment of isotopes of the actinide group of heavy metals with uncharged nuclear particles. The example of the first type preparation method is the bombardment of Pu^{239} with helium ions in the cyclotron, which results in the formation of element 96 through the following reaction: $Pu^{239}(\alpha,n)Cm^{242}$. An example of the second type of preparation method is the bombardment of Am^{241} with neutrons in a neutronic reactor of the pile type which results in the formation of element 96 through the following series of reactions:

$$95^{241}(n,\gamma)95^{242} \qquad 95^{242} \xrightarrow{\beta^-} 96^{242}$$

The charged particle bombardment of heavy metal isotopes to produce curium is usually carried out in a charged particle accelerator of the cyclotron type, although other accelerators, for example, linear accelerators and synchrotrons, may be used. The reaction conditions under which the first curium to be identified was produced comprised the bombardment of Pu^{239} with alpha particles in a cyclotron. Both the 240 and 242 curium isotopes

may be produced in this manner as shown by the following reactions: $Pu^{239}(\alpha,n)Cm^{242}$ and $Pu^{239}(\alpha,3n)Cm^{240}$. The energies of the accelerated particles required to accomplish this reaction will vary with the conditions under which the reaction is carried out. These factors are well known, however, and the optimum energy for the reaction desired may be easily calculated. In general, for the alpha bombardment of Pu^{239}, alpha energies of between 30 and 40 mev. have been found desirable. The plutonium targets for cyclotron bombardment may be prepared by the evaporation of a suitable plutonium solution, for example plutonium nitrate, on grooved platinum plates followed by mild ignition to form plutonium oxide. Following bombardment the curium may then be separated from the plutonium by the chemical methods which will be subsequently set forth in this application. Other heavy metal isotopes than Pu^{239} may also be used as the target material, for example other isotopes of plutonium and isotopes of neptunium and americium may be used. Similarly, the charged particle used in the accelerator is not limited to the alpha particle, but ions of protium, deuterium, tritium, and He^3 may also be used. The preparation of curium by the charged-particle bombardment method may be further illustrated by the following example.

EXAMPLE I

The Pu^{239} target was prepared as described above with 100 mg. of plutonium (as the oxide) deposited upon the platinum target plate. The plutonium target was then exposed to a bombardment of helium ions of energy 40 mev. in a 60-inch cyclotron for 63.1 microampere hours. Following the bombardment the plutonium oxide was dissolved by treatment with sulfuric acid, and the sulfuric acid solution then evaporated to dryness. This was followed by dissolution of plutonium sulfate in dilute nitric acid and the remaining undissolved oxide was dissolved by heating with nitric acid together with a small amount of added hydrofluoric acid. The plutonium in solution was then oxidized to the hexavalent state. Lanthanum fluoride was then precipitated from the solution, carrying with it the insoluble curium trifluoride and leaving in solution the soluble hexavalent plutonium fluoride. The alpha activity of the precipitate was found to be about 2×10^5 alpha particle disintegrations/min. This alpha activity was analyzed with the alpha pulse multi-channel analyzer and it was found that 20% of this activity was 96^{242} activity with a range of 4.75 cm., the remaining 80% being due to another alpha-emitter, which emitted alpha particles with a range of 4.95±0.1 cm. in air at 15° C. and 760 mm. of mercury pressure. The over-all initial decay sample gave a half-life of about one month indicating that the half-life of the 4.95 cm. range activity was somwhat less than one month and later resolution gave the value of 26.8 days. This activity was definitely identified to be 96^{240} by the following method. The sample of this activity was set aside and allowed to decay from the second to the fourth day after shut-down of the cyclotron. The plutonium fraction was then isolated and a pulse analysis curve, as well as an alpha decay curve of this plutonium sample gave definite evidence of Pu^{236}. The element 96 fraction was then allowed to grow plutonium again (77 days of growth) and the amount of Pu^{236} which was grown was quantitatively determined by the addition of Pu^{239} tracer to establish the chemical loss in the process of separation of the plutonium from the element 96. The additional details of this experiment which allowed a calculation of a half-life of the element 96 parent were as follows: A sample of a 96^{242}–96^{240} mixture that contains 1.38×10^5 alpha counts/min. and in which initially 70.2% of the counts were due to 96^{240} was allowed to decay for 77

How do I apply for a patent?

Step 1. Visit your Technology Transfer office or local Patent Office. Get information on (i) your rights (ii) obligations and (iii) procedures.

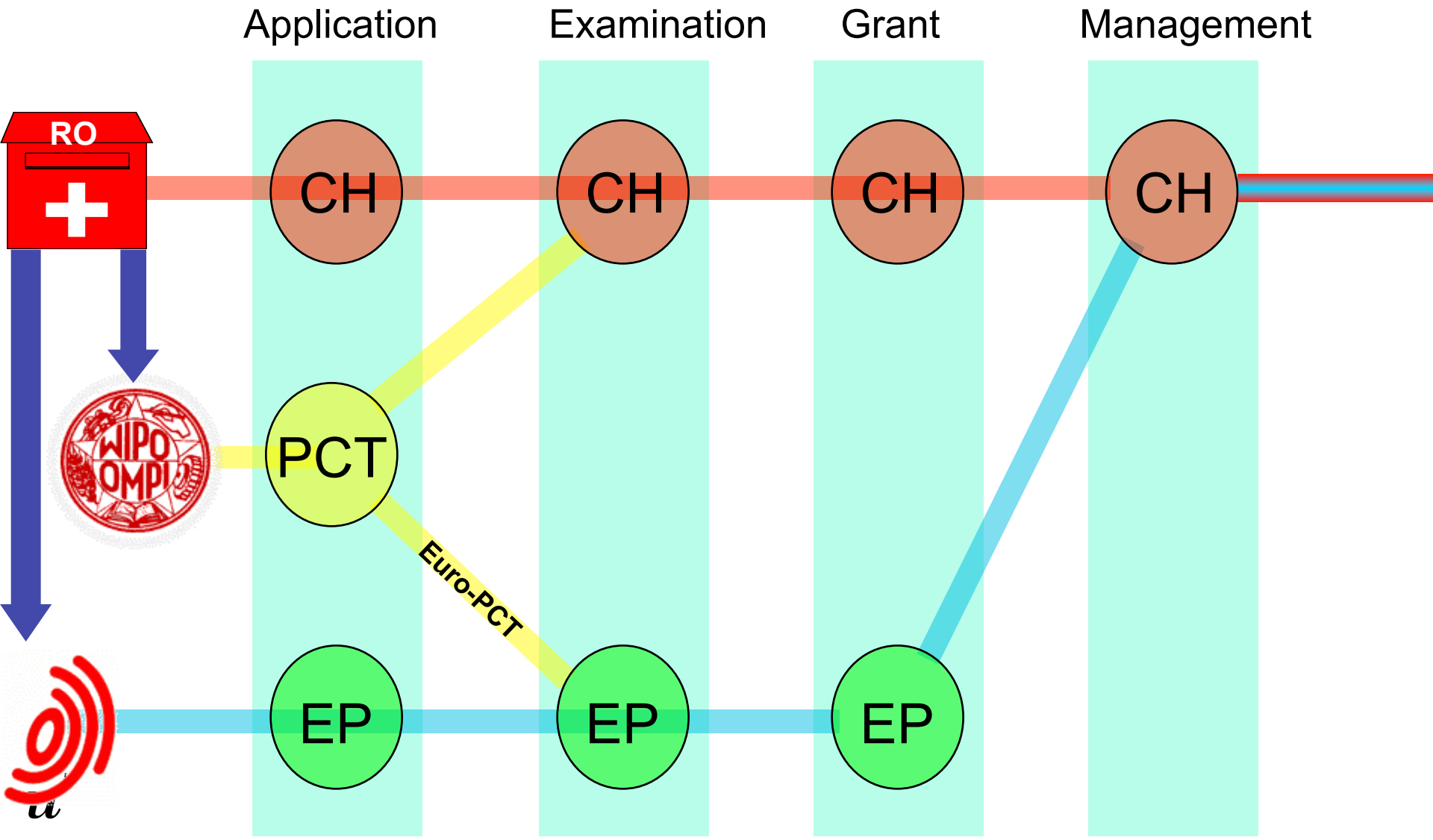
Step 2. For the procedural aspects and patent prosecution process, let the pros handle it.

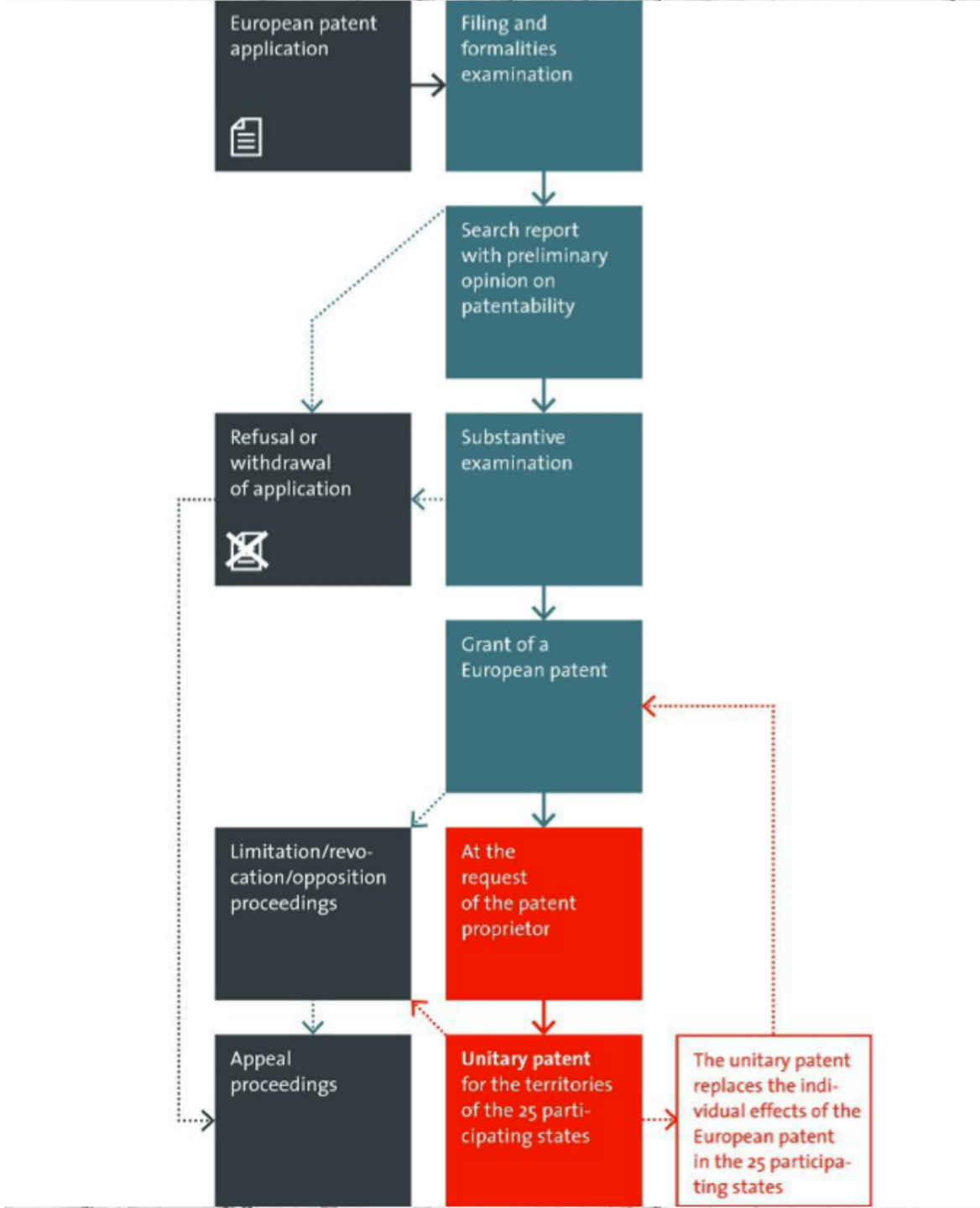
Step 3. Read the small print of your contracts (employment, collaboration, consortium, etc) as to owns the intellectual property that you generate.

world trade institute

Patent Routes

nccr trade regulation
swiss national centre of competence in research




European patent application
Filing and formalities examination
Search report with preliminary opinion on patentability
Refusal or withdrawal of application
Substantive examination
Grant of a European patent
Limitation/revocation/opposition proceedings
At the request of the patent proprietor
Appeal proceedings
Unitary patent for the territories of the 25 participating states
The unitary patent replaces the individual effects of the European patent in the 25 participating states

III – Patents: bibliographic data, description, and claims.

Patent Specification

Structure		**Use**
Bibliographic data	→	a. Search, database fields
Description	→	b. Technological disclosure
Claims	→	c. Legal text

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 September 2005 (09.09.2005)

PCT

(10) International Publication Number
WO 2005/083811 A3

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(71) Applicants *(for all designated States except US)*: **EVERGREEN SOLAR, INC.** [US/US]; 259 Cedar Hill Street, Marlboro, MA (US). **MIDWEST RESEARCH INSTITUTE** [US/US]; 425 Volker Boulevard, Kansas City, MO 64110 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **GINLEY, David, Samuel** [US/US]; 3360 Inverness Drive, Evergreen, CO 80439 (US). **HANOKA, Jack, I.** [US/US]; 107 York Terrace, Brookline, MA 02146 (US).

(74) Agent: **VERNON, Deborah, M.**; Proskauer Rose LLP, One International Place, Boston, MA 02110 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

[Continued on next page]

(54) Title: ORGANIC SOLAR CELLS INCLUDING GROUP IV NANOCRYSTALS AND METHOD OF MANUFACTURE

US 20120037560A1

(19) **United States**

(12) **Patent Application Publication**

Ginley et al.

(10) **Pub. No.: US 2012/0037560 A1**

(43) **Pub. Date: Feb. 16, 2012**

(54) **POROUS BLOCK NANOFIBER COMPOSITE FILTERS**

(75) Inventors: **David S. Ginley**, Golden, CO (US); **Calvin J. Curtis**, Golden, CO (US); **Alexander Miedaner**, Golden, CO (US); **Alan J. Weiss**, Dallas, TX (US); **Arnold Paddock**, Dallas, TX (US)

(73) Assignee: **Alliance for Sustainable Energy, LLC**, Golden, CO (US)

(21) Appl. No.: **13/130,109**

(22) PCT Filed: **Nov. 21, 2008**

(86) PCT No.: **PCT/US2008/084434**

§ 371 (c)(1), (2), (4) Date: **Oct. 6, 2011**

Publication Classification

(51) **Int. Cl.**

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B01J 20/28	(2006.01)
B01J 20/30	(2006.01)
B01D 35/00	(2006.01)
B01D 15/08	(2006.01)
B82Y 30/00	(2011.01)

(52) **U.S. Cl.** **210/446**; 210/501; 210/502.1; 502/400; 210/509; 502/417; 502/402; 502/404; 502/401; 502/414; 502/415; 502/7; 977/902

(57) **ABSTRACT**

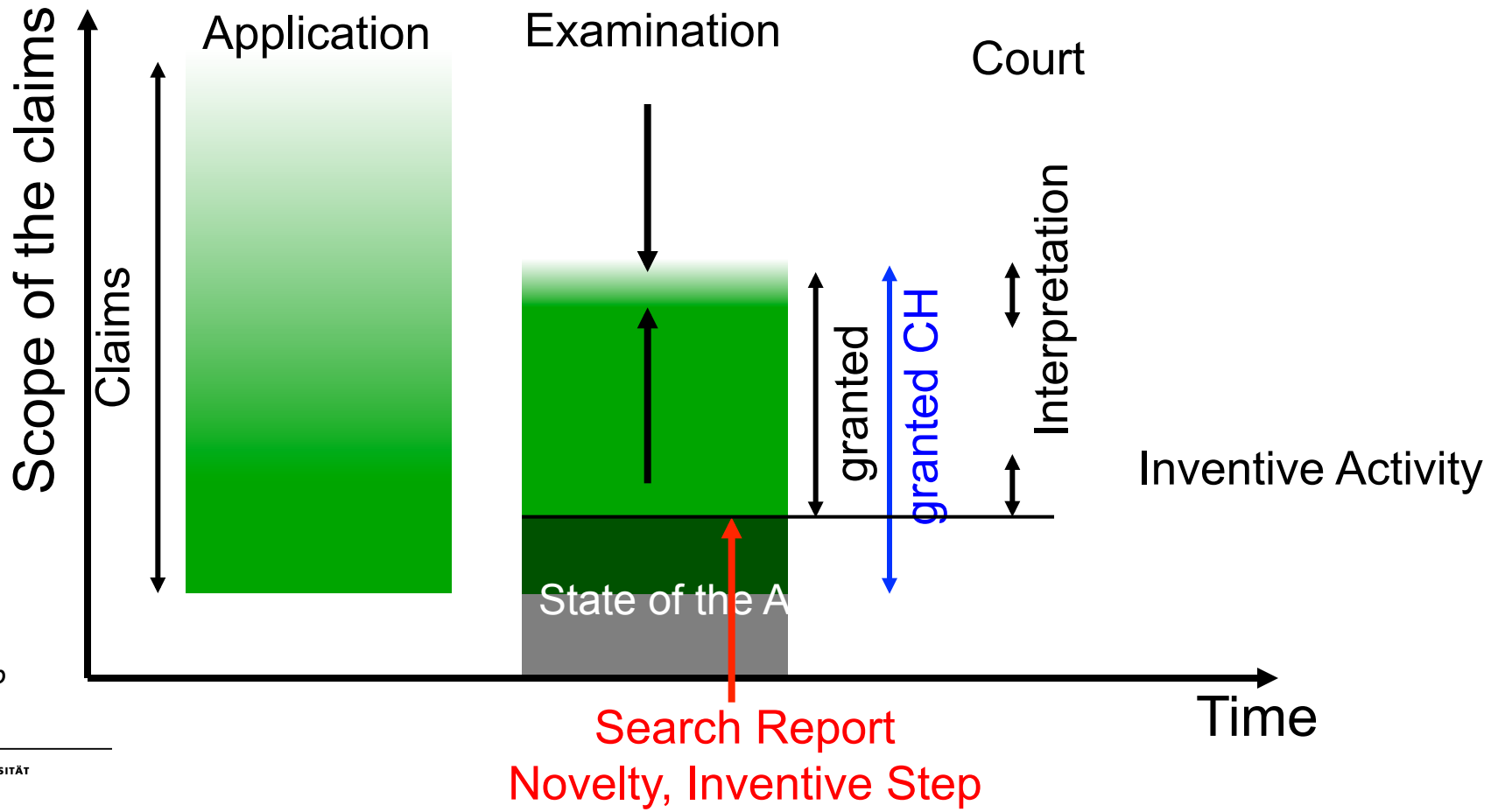
Porous block nano-fiber composite (**110**), a filtration system (**10**) and methods of using the same are disclosed. An exemplary porous block nano-fiber composite (**110**) includes a porous block (**100**) having one or more pores (**200**). The porous block nano-fiber composite (**110**) also includes a plurality of inorganic nano-fibers (**211**) formed within at least one of the pores (**200**).

Patent Kind Codes

- WO WIPO (World Intellectual Property Organization)
- **A1** PCT International Application (With search report)
- **A2** PCT International Application (Without search report)
- **A3** PCT International Application Search Report A9 Republished PCT International Application or PCT International Application Search Report

Patent Prosecution

Examination:



INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/031611

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L51/20 H01L31/0384

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 7 H01L

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 practical, search terms used)
EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 986 206 A (KAMBE ET AL) 16 November 1999 (1999-11-16) the whole document	1,2,4,5, 16-19, 21,22, 31-33, 36,41, 43-45, 55-57
Y		46-49,52
X	WO 02/43159 A (ARCH DEVELOPMENT CORPORATION) 30 May 2002 (2002-05-30) page 1, line 7 - page 11, line 2	1,2, 5-10,13, 16,18, 19, 21-28, 31,33-40
Y		46-49,52

-/—

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

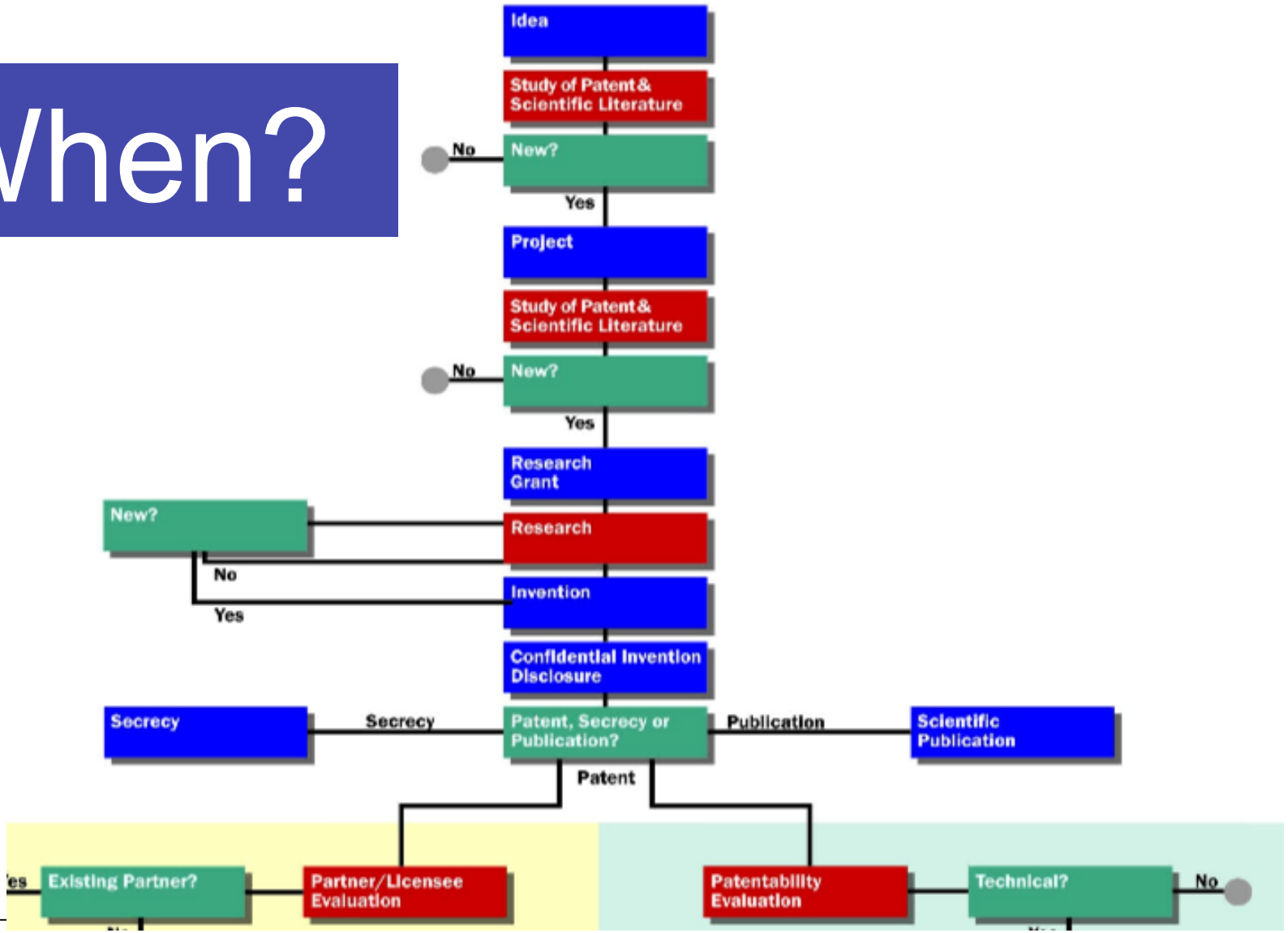
Date of the actual completion of the international search	Date of mailing of the international search report
13 October 2005	26/10/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Voignier, V

Form PCT/ISA/210 (second sheet) (January 2004)

IV – Prior Art, Science, Internet and Open Access.

When?


Idea
Study of Patent& Scientific Literature
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Yes
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Yes
Research Grant
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Research
No
Invention
Yes
Confidential Invention Disclosure
Secrecy
Secrecy
Patent, Secrecy or Publication?
Publication
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pa	Applicant	pa=siemens
ti	Title	ti=mouse trap
ab	Abstract	ab=mouse trap
pr	Priority number	pr=ep20050104792
pn	Publication number	pn=ep1000000
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pd	Publication date	pd=20080107 or pd="07/01/2008" or pd=07/01/2008
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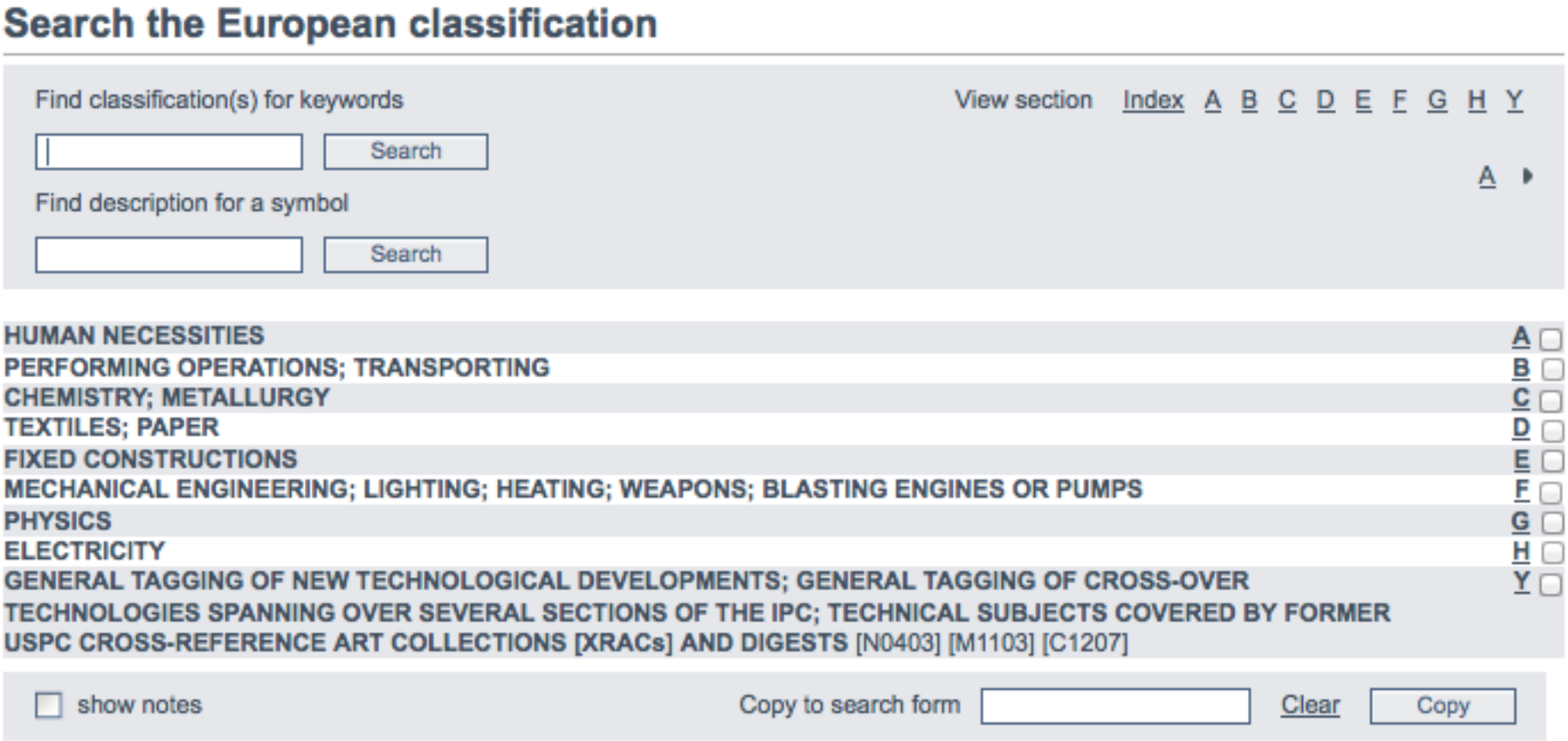

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Bibliographic data: US2011167821 (A1) — 2011-07-14

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COMBUSTION SYSTEMS, POWER PLANTS, AND FLUE GAS TREATMENT SYSTEMS INCORPORATING SWEEP-BASED MEMBRANE SEPARATION UNITS TO REMOVE CARBON DIOXIDE FROM COMBUSTION GASES

Page bookmark	US2011167821 (A1) - COMBUSTION SYSTEMS, POWER PLANTS, AND FLUE GAS TREATMENT SYSTEMS INCORPORATING SWEEP-BASED MEMBRANE SEPARATION UNITS TO REMOVE CARBON DIOXIDE FROM COMBUSTION GASES
Inventor(s):	BAKER RICHARD W [US]; WIJMANS JOHANNES G [US]; MERKEL TIMOTHY C [US]; LIN HAIQING [US]; DENIELS RAMIN [US]; THOMPSON SCOTT [US] +
Applicant(s):	MEMBRANE TECHNOLOGY AND RES INC [US] +
Classification:	**- international:** ***B01D53/22; B01D53/62; F01K27/00; F25J3/08***
	- European: B01D53/22; Y02C10/10; Y02E50/34D
Application number:	US201113071331 20110324
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Also published as:	US8016923 (B2) US2009277326 (A1) US8114192 (B2) WO2009139835 (A1) US2010236404 (A1) → more

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US2011167821 A1

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(12) **United States Patent**
Baker et al.

(10) **Patent No.: US 8,114,192 B2**
(45) **Date of Patent: Feb. 14, 2012**

(54) **GAS SEPARATION PROCESSES USING MEMBRANE WITH PERMEATE SWEEP TO RECOVER REACTION FEEDSTOCKS**

(75) Inventors: **Richard W. Baker**, Palo Alto, CA (US); **Johannes G. Wijmans**, Menlo Park, CA (US); **Timothy C. Merkel**, Menlo Park, CA (US)

(73) Assignee: **Membrane Technology & Research, Inc**, Menlo Park, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 340 days.

(21) Appl. No.: **12/454,043**

(22) Filed: **May 11, 2009**

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Related U.S. Application Data

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(51) **Int. Cl.**
B01D 53/22 (2006.01)

(52) **U.S. Cl.** **95/45**; 95/47; 95/50; 95/54; 95/55; 96/4; 96/9; 423/226; 423/414; 423/579; 423/359; 422/187; 422/234; 585/818; 585/819; 585/903

(58) **Field of Classification Search** 95/45, 47, 95/50, 55, 54; 96/4, 7, 9; 423/226, 414, 423/579, 359; 422/187, 234; 585/818, 819, 585/903

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Primary Examiner — Jason M Greene
(74) *Attorney, Agent, or Firm* — J. Furrant; K. Bean

(57) **ABSTRACT**

A gas separation process for treating off-gas streams from reaction processes, and reaction processes including such gas separation. The invention involves flowing the off-gas across the feed side of a membrane, flowing a sweep gas stream, usually air, across the permeate side, and passing the permeate/sweep gas mixture to the reaction. The process recovers unreacted feedstock that would otherwise be lost in the waste gases in an energy efficient manner.

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