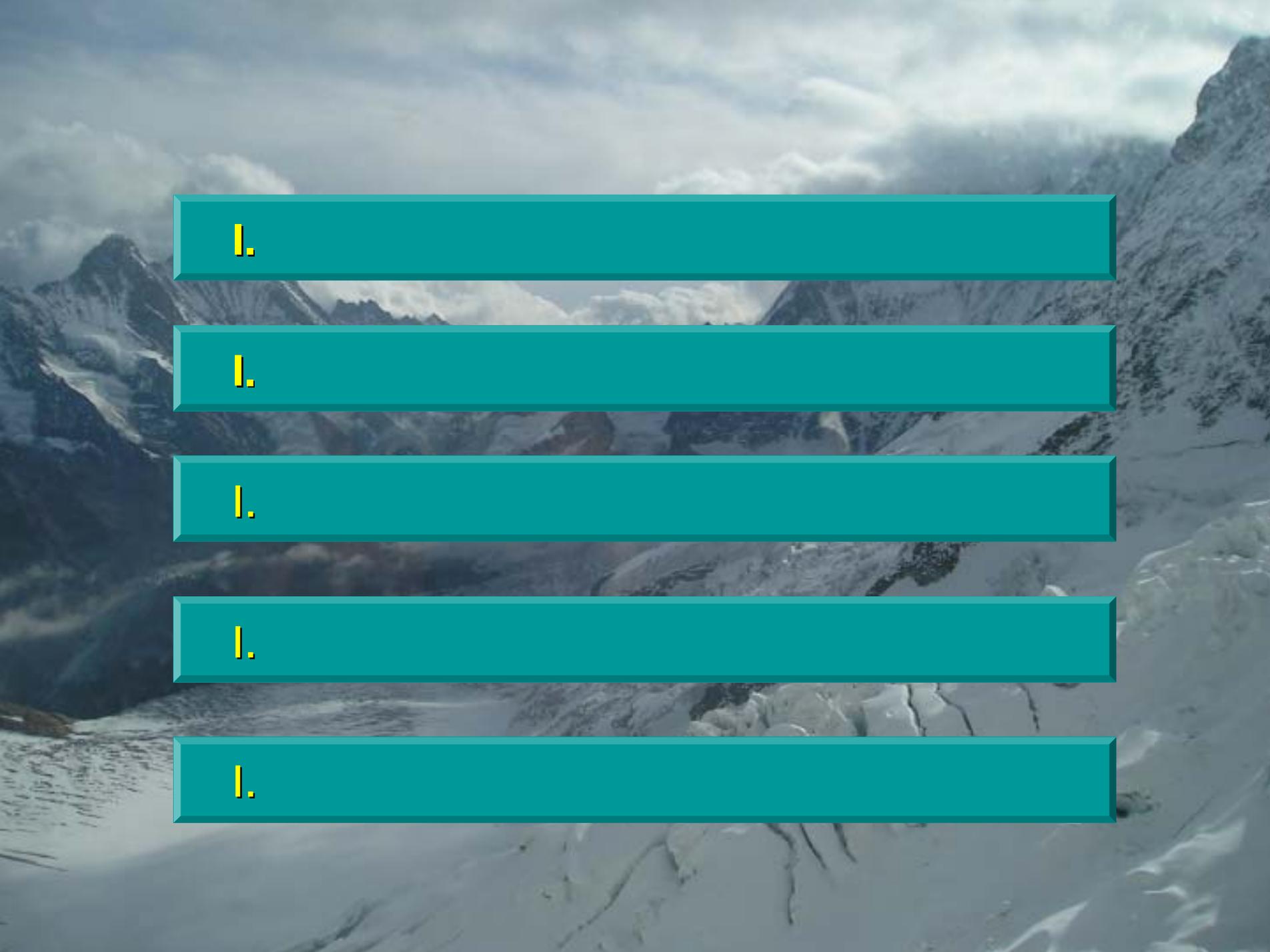


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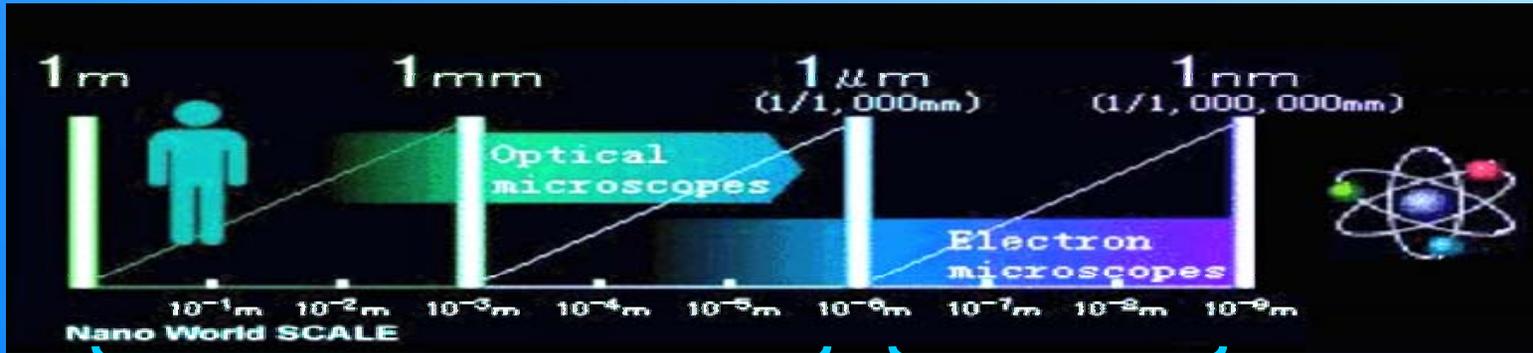
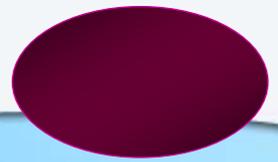
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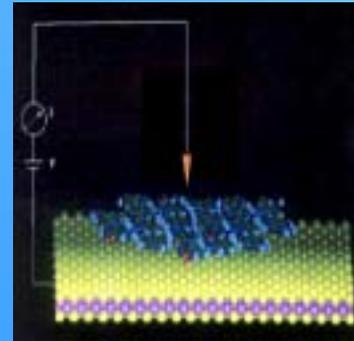
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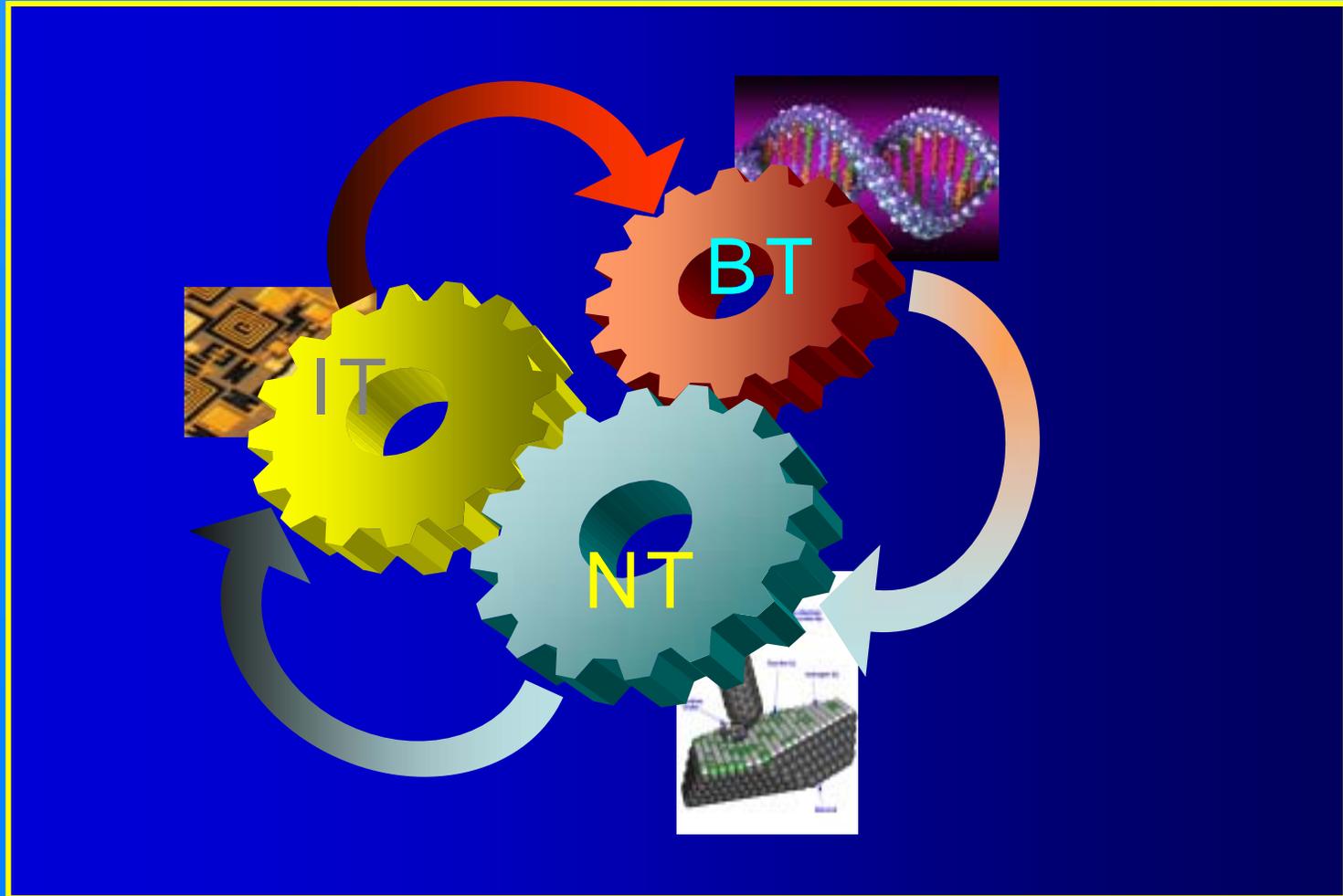


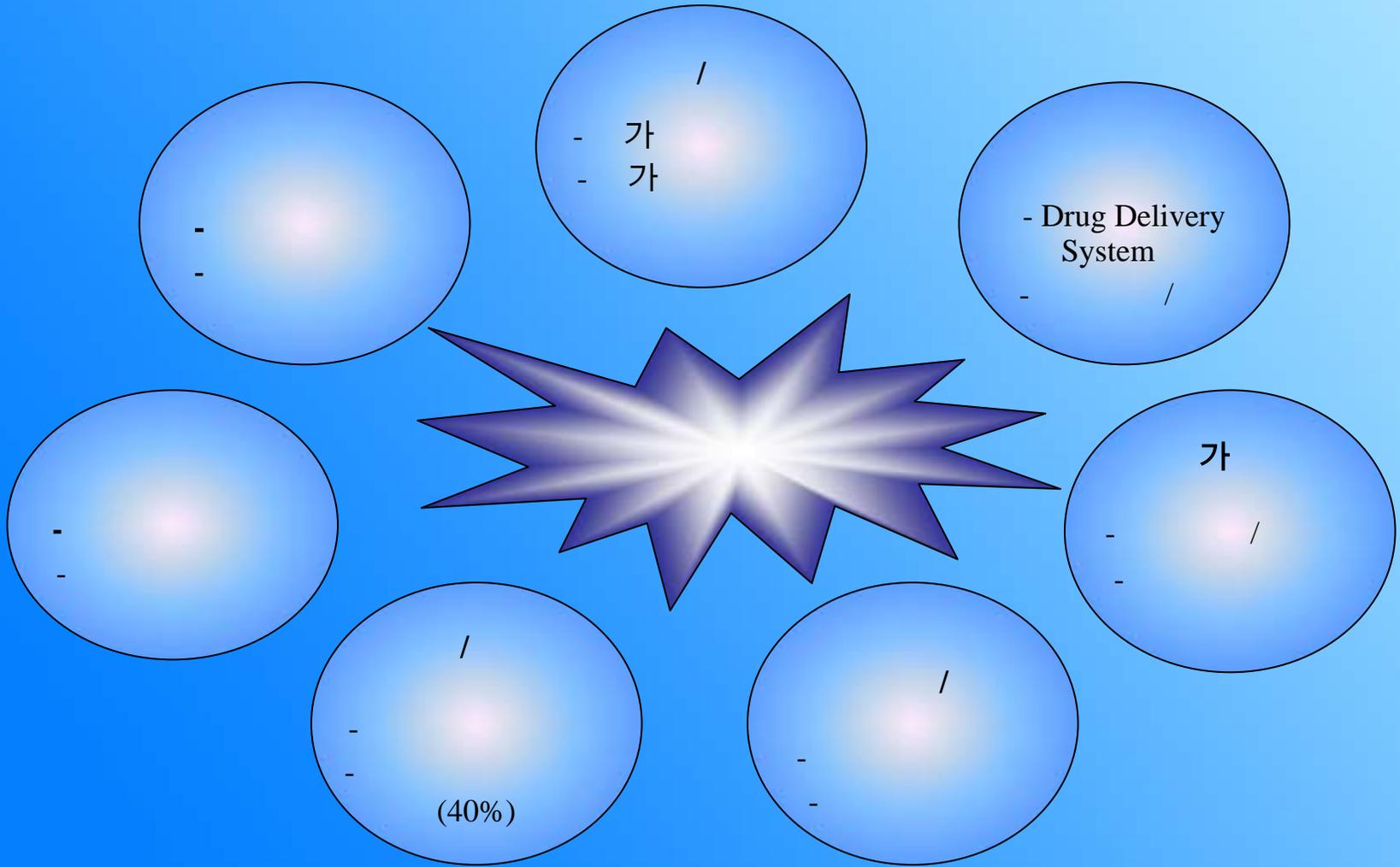
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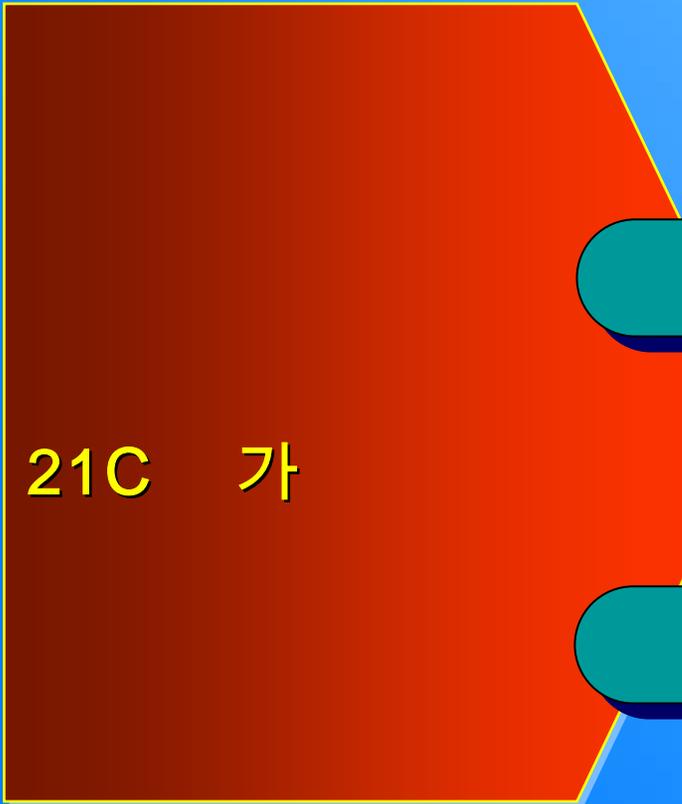


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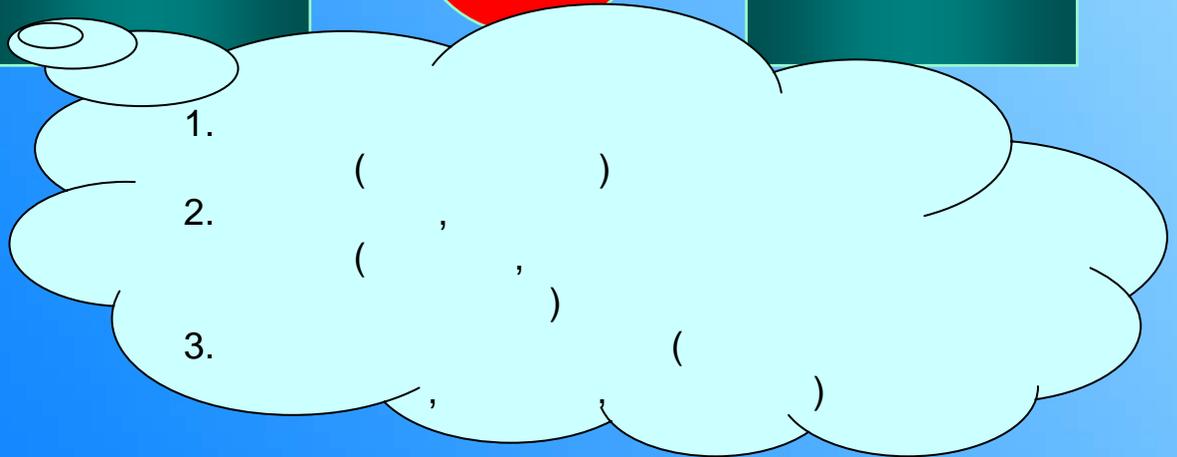
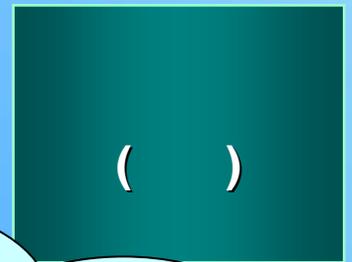
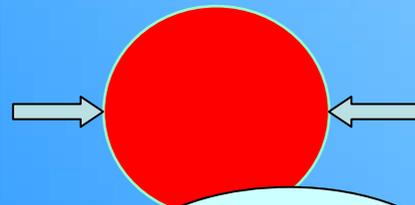
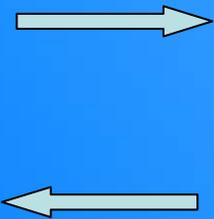
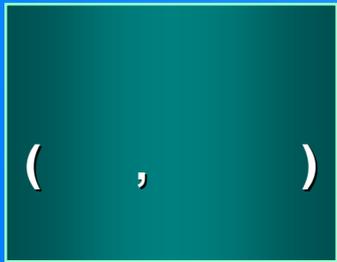
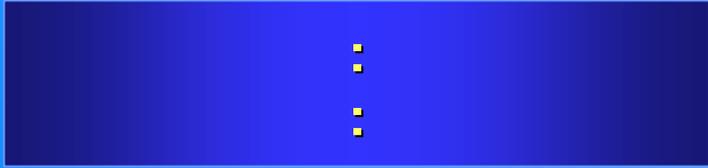
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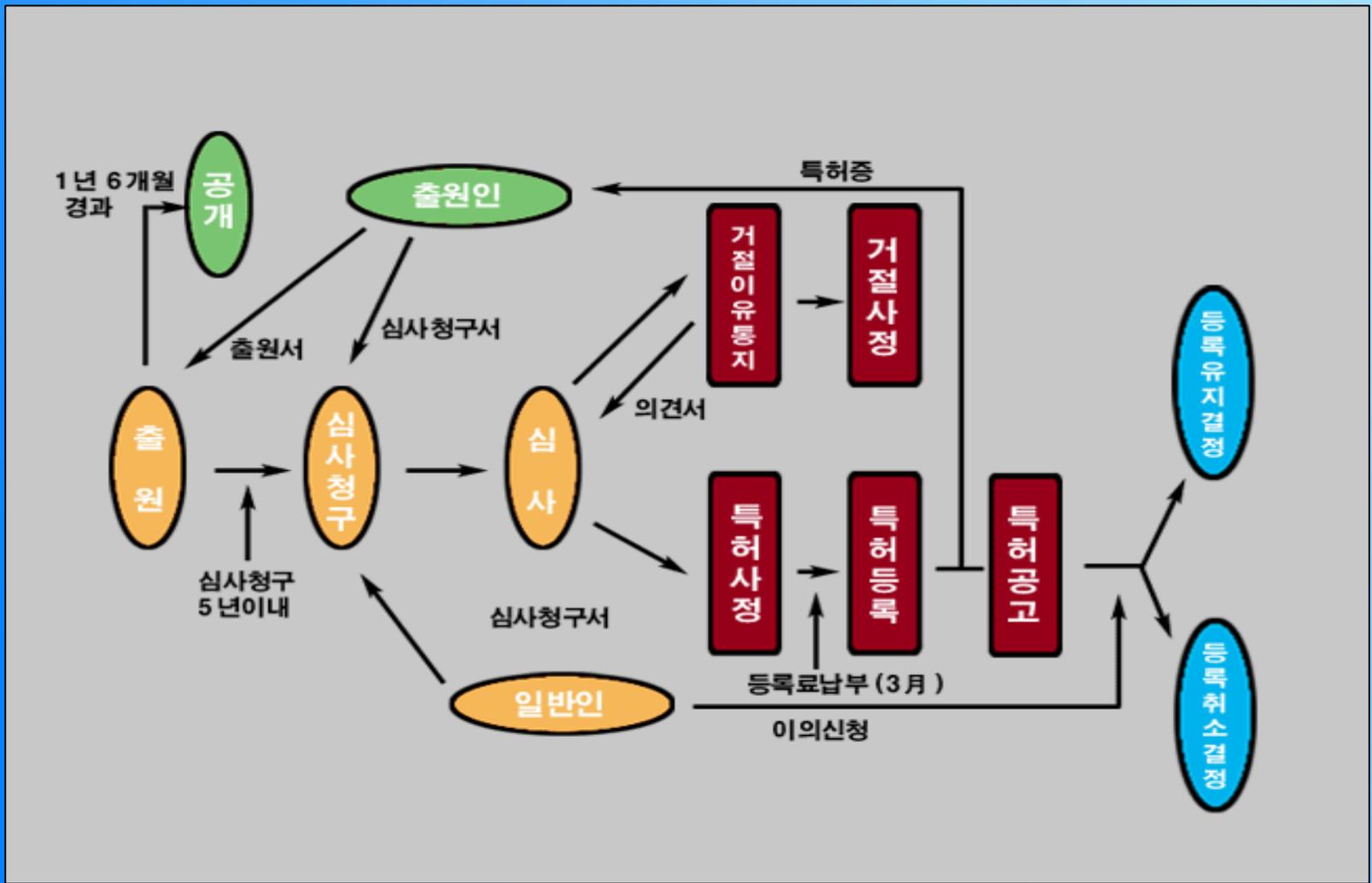
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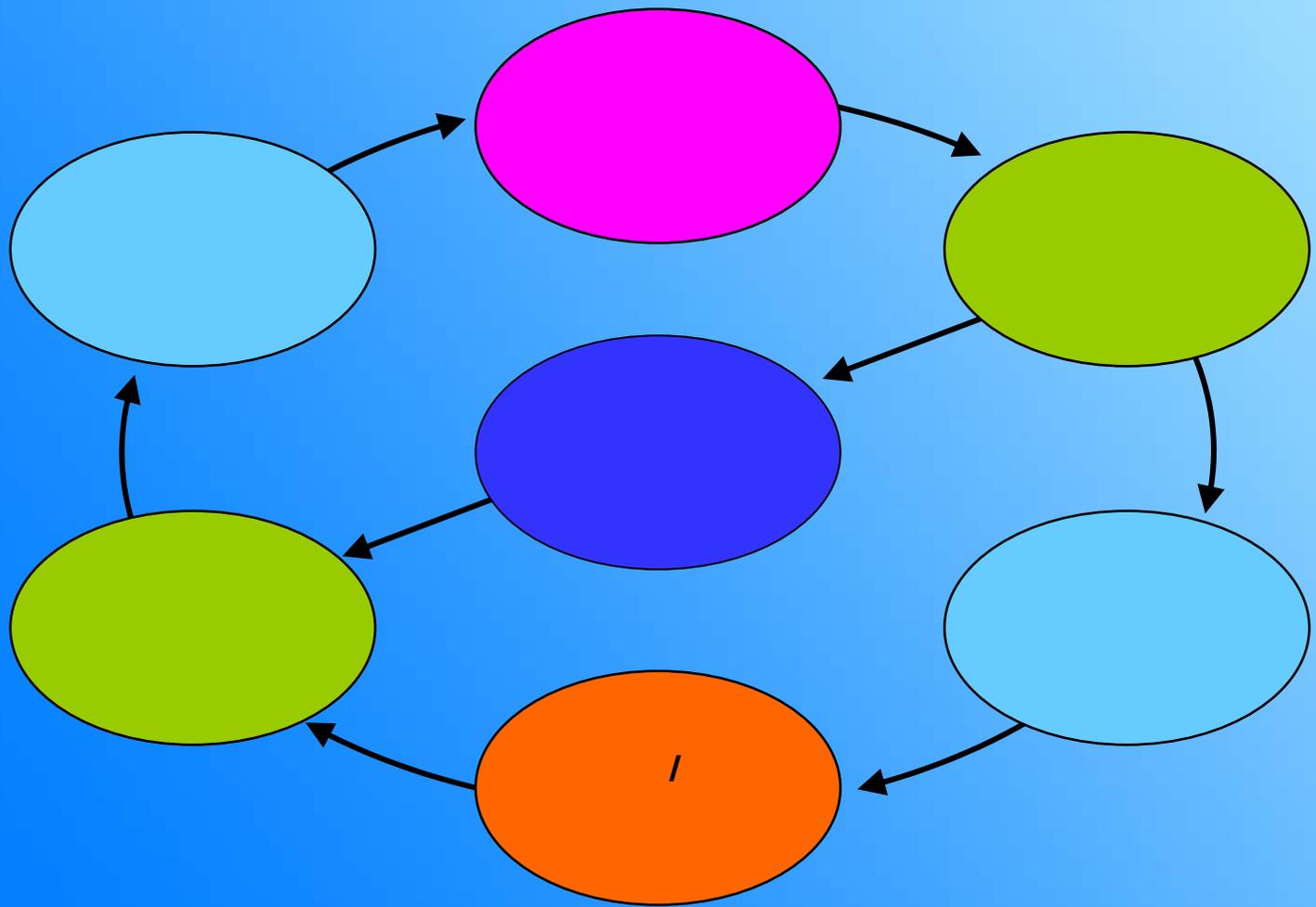
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(54) **METHOD FOR INCORPORATING METAL NANOPARTICLES IN POROUS MATERIALS**

(75) **Inventors:** **Yutaka Tai, Aichi (JP); Koji Tajiri, Aichi (JP); Masao Watanabe, Aichi (JP); Sakae Tanemura, Aichi (JP)**

(73) **Assignee:** **National Institute of Advanced Industrial Science and Technology, Tokyo (JP)**

(*) **Notice.** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **10/101,175**

(22) **Filed:** **Mar. 20, 2002**

(30) **Foreign Application Priority Data**

Dec. 7, 2001 (JP) 2001-374445

(51) **Int. Cl.⁷** **B82B 1/00; B82B 3/00; H01B 1/02**

(52) **U.S. Cl.** **252/512; 252/512; 252/513; 252/514; 75/343; 75/362; 75/392; 428/546; 428/550; 428/361; 428/370; 516/113; 516/198; 423/338; 423/625; 423/22; 423/33; 423/25**

(58) **Field of Search** **252/512, 513, 252/514; 75/343, 362, 392; 428/546, 550, 361, 370, 516/113, 198, 423/338, 625, 22, 23, 25**

(56) **References Cited**

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JP 2001089139 * 4/2001 C01G7/07

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Y. Tai, et al., *Advanced Materials*, vol. 13, No. 21, pps. 1611-1614, "Preparation of Gold Cluster/Silica Nanocomposite Aerogel Via Spontaneous Wet-Gel Formation", Nov. 2, 2001.

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Primary Examiner Yogendra N Gupta

Assistant Examiner—Kallambella Vijayakumar

(74) *Attorney, Agent, or Firm*—Oblon, Spivak, McClelland, Maier & Neustadt, P.C.

(57) **ABSTRACT**

The method of preparing the porous material incorporating ultrafine metal particles comprises the following steps: (1) preparing surface-protected ultrafine metal particles by reducing metal ions in the presence of molecules such as dodecanethiol molecules; (2) immersing a wet gel in a solution of the ultrafine metal particles, thus forming an ultrafine metal particle/wet gel composite in which the ultrafine metal particles are incorporated in the wet gel; and (3) drying the ultrafine metal particle/wet gel composite to form a porous body.

10 Claims, 4 Drawing Sheets

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기술정보' 로서의 활용

권리정보' 로서의 활용

'경영정보' 로서의 활용

파악
정보

기술개발 동향
핵심기술, 기본특허
융합기술(기술상관관계)
기술분포 현황

특허권리 범위
특허취득, 침해가능성
권리상태, 권리기한 및
권리권자 확인

기업기술 및 상품개발 동향
기업 연구관리 동향
시장참여 현황
국가별 시장규모 예측

활용
방안

연구테마 선정
기술개발 방향설정, 변경
향후 출현상품 예측
사전매입특허 확인

특허출원여부 결정
Claim처리
자사 특허권리 범위 확정
협력 기업 확인
로열티 산정

연구개발 전략 수립
특허관리 방향설정
기업협력, 매수전략 수립
특허출원 국가선정
우수 연구원 영입

중소-벤처기업, 연구소, 대학의 기술개발의 과제 및 방향설정, 특허의 출원방안 및 활용로서 활용

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(Claim) :

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	8	108	618	6,932	59,759	66,691
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Broad patent rights granted for Pioneering inventions

✓ New Rule : (Size)

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There are many nanotech patents with overlapping claims

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Patent become valuable when they cover commercial products

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NanoPatent(Definition)

- **Developed at critical length scale of matter, typically under 100 nanometers**
 - **Manipulation, processing and fabrication under control of the nanoscale structures**
- **Novel properties and phenomena**
 - **Special effects, are attributed to and are intrinsic at the nanoscale**
- **USPTO Class 977**

NanoPatent(1)



(10) **United States**
 (12) **Patent Application Publication** 1109 Pub. No.: **US 2002/0024099 A1**
 Watanabe et al. (43) Pub. Date: **Feb. 28, 2002**

(51) **TRANSISTOR** (52) **Foreign Application Priority Data**

Aug. 31, 2000 (JP) 2000-265944

Publication Classification

(51) **Int. Cl.7** H01L 31/119, H01L 31/118;

H01L 39/04

(52) **U.S. Cl.** 257/368

(57) **ABSTRACT**

A transistor of nanometer size is provided, which is capable of high speed operation and operates at room temperature by using carbon nanotubes for semiconductor devices. The transistor uses a carbon nanotube ring having semiconducting characteristics as a semiconductor material, or a carbon nanotube ring having conductivity or semiconductor characteristics as an electrode material.

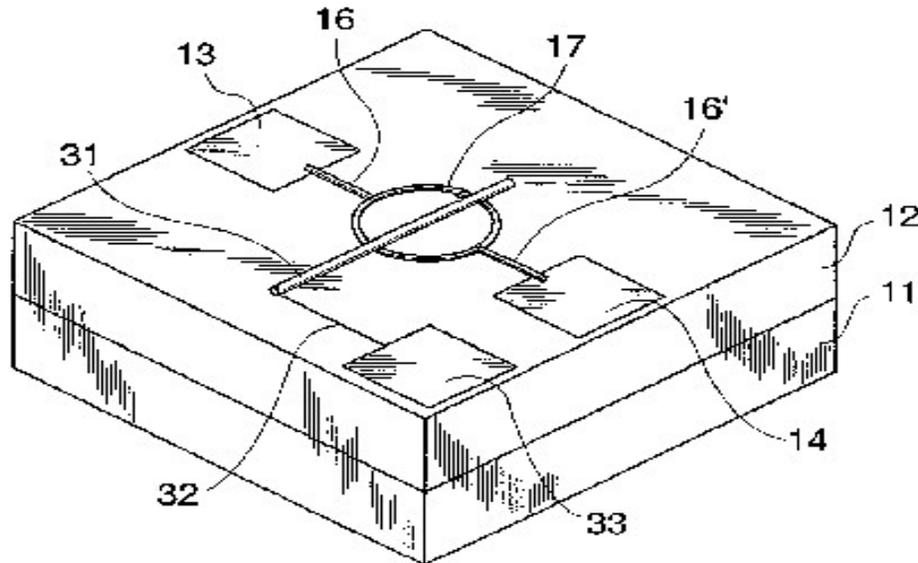
(75) **Inventor:** Hirovuki Watanabe,
 Minamishiga, zhi (JP); Masahiko
 Shimizu, Nekai-chochi (JP); Chikara
 Minabe, Minamishiga, zhi (JP)

Correspondence Address:
OLIFF & BERRIDGE, PLC
 P.O. BOX 1992h
 ALEXANDRIA, VA 22320 (US)

(73) **Assignee:** Fuji Xerox Co., Ltd., Minato-ku (JP)

(21) **Appl. No.:** 09/923,448

(22) **Filed:** Aug. 8, 2001



- Nano-transistor
- Material Replacement
- Carbon nanotube



NanoPatent(2)

(54) 탄소나노튜브를 이용한 고품질의 바이오분자 검출센서

요약

본 발명은 기질 위에 복수의 탄소나노튜브를 배열하고, 표적 바이오분자와 결합하는 리셉터의 순전하(net charge)와 반대되는 극성의 전하를 탄소나노튜브에 인가하여, 한 종류 또는 여러 종류의 리셉터를 원하는 위치에 선택적으로 부착할 수 있는 나노 수준으로 고집적화된 나노어레이형(nanoarray-type) 바이오칩에 관한 것이다. 또한, 본 발명은 기질 위에 마이크로 또는 나노 크기의 멀티채널을 제작하고, 채널내의 특정위치에 하나 또는 둘 이상의 탄소 나노튜브를 배열하고, 그 위에 표적 바이오분자와 결합하는 리셉터를 선택적으로 부착할 수 있는 멀티채널형(multichannel-type) 바이오칩에 관한 것이다.

본 발명에 따르면, 부착된 다양한 종류의 리셉터(target-biomolecules)를 직접 검출하여 진단을 보다 정확히 한번에 대량으로 할 수 있다.

도면

도 3

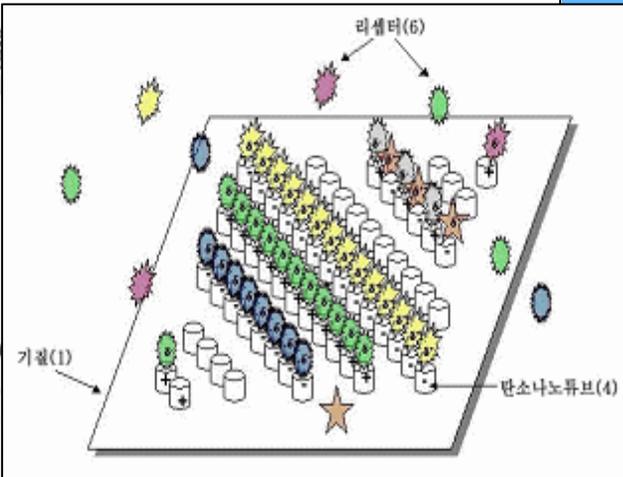
명세서

도면의 간단한 설명

- 도 1은 수직 탄소 나노튜브(vertical carbon nanotube)를 배열한 구조를 나타낸다.
- 도 2는 다양한 형태의 모양을 갖는 탄소나노튜브를 배열한 구조를 나타낸다.
- 도 3은 본 발명의 나노어레이 타입(nanoarray-type) 바이오칩의 구조를 나타낸다.
- 도 4는 본 발명의 멀티채널 타입(multichannel-type) 바이오칩의 구조를 나타낸다.
- 도 5는 본 발명의 나노어레이 타입의 바이오분자 검출센서에서 리셉터-프로브(receptor-probe)들과 표적 단백질(target-protein)의 상호작용을 보여주는 개략도이고,
- 도 6은 본 발명의 멀티채널 타입의 바이오분자 검출센서에서 리셉터-프로브(receptor-probe)들과 표적 단백질(target-protein)의 상호작용을 보여주는 개략도이다.

<도면의 주요부분에 대한 부호의 설명>

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|----------------|------------|
| 1. 기질 | 2. 전도층 |
| 3. 절연층 | 4. 탄소 나노튜브 |
| 5. 소혈청알부민(BSA) | 6. 리셉터 |
| 7. 표적단백질 | 8. 일반단백질 |
| 9. 광 또는 레이저 | 10. 유리 커버 |



- A high capacity of biomolecule detecting sensor using carbon nanotubes is provided, thereby rapidly detecting various kinds of target-biomolecules bound with receptors on a nanoarray-type biochip.



NanoPatent(3)

- **USP 5,424,054**
- **Issue Date : June 13, 1995**
- **Inventor(s) : Bethune**
- **Patent Holder : IBM**
- **Licensee(s) : Carbon nanotechnologies**
- **Claim(s) :**
- **3. A hollow carbon fiber having a wall consisting essentially of a single layer of carbon atoms**
- **Description of Technology : gas sensors, microscope tips, computer processing technology, memory devices, field emission displays, fuel cells, molecular diagnostics, and others**

What is being claimed

1. A nanocomposite comprising clay and an organic compound, in which the clay is a clay bridged with a metal compound.

2. A nanocomposite according to claim 1, in which the metal is iron and/or aluminum.

3. A nanocomposite according to claim 1, in which the clay of the nanocomposite is selected from montmorillonite, laponite, beidellite, nontronite, saponite, sauconite, hectorite, stevensite, kaolinite, halloysite, vermiculite, and sepiolite, or one of their synthetic or naturally interstratified mixtures.

4. A nanocomposite according to claim 1, in which the clay of the nanocomposite is laponite or montmorillonite.

(57) 청구의 범위

청구항 1. 발광하도록 유도될 수 있는 표지 화합물에 결합된 성분에 부착되는 나노튜브.

청구항 2. 제 1 항에 있어서, 나노튜브가 흑연질이고 발광이 전기화학발광인 나노튜브.

청구항 3. 제 1 항에 있어서, 성분이 효소 바이오센서인 흑연 나노튜브.

청구항 4. (i) 작용그룹을 함유하는 흑연 나노튜브, 및

(ii) 작용그룹에 결합되어 있고, 해당 분석물에 결합할 수 있는 분석-수행 물질을 포함하는, 샘플에 존재하는 해당 분석물 검출용 조성물.

청구항 5. (i) 작용그룹을 함유하는 흑연 나노튜브, 및

(ii) 작용그룹에 결합되어 있고, 해당 분석물에 결합되는 분석-수행 물질을 포함하는, 샘플에 존재하는 해당 분석물 검출용 조성물.

청구항 6. 제 5 항에 있어서, 분석물에 결합되어 있고, 발광하도록 유도될 수 있는 표지 화합물에 결합되는 제 2 분석-수행-물질을 추가로 포함하는 조성물.

Nanocomposite

Nanotube

Primary types of Patent Claims in Nanotechnology

- **Composition of matter()**
 - Nanomaterials such as nanotubes, nanowires, and nanoparticles
- **Device, apparatus or system()**
 - Electrical, mechanical, and optical devices incorporating nanomaterials
 - Tools used to prepare, characterize
- **Method or Process()**
 - Synthesizing nanomaterials or constructing devices or systems

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- (Prior Art)
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- Dictionary-based analysis of terms; Definition
- Claim 가

- NanoPublications
- NanoPatents
- ✓ Keywords

(2) Patent Map

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Cross License

Claim

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- - Keyword + IPC Search
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- - Quantum Dots (both semiconductor and tagging biological materials)
 - (~300)
 - Hyperion Catalysis International (~83)
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No nanotechnology without patenting

THANK U