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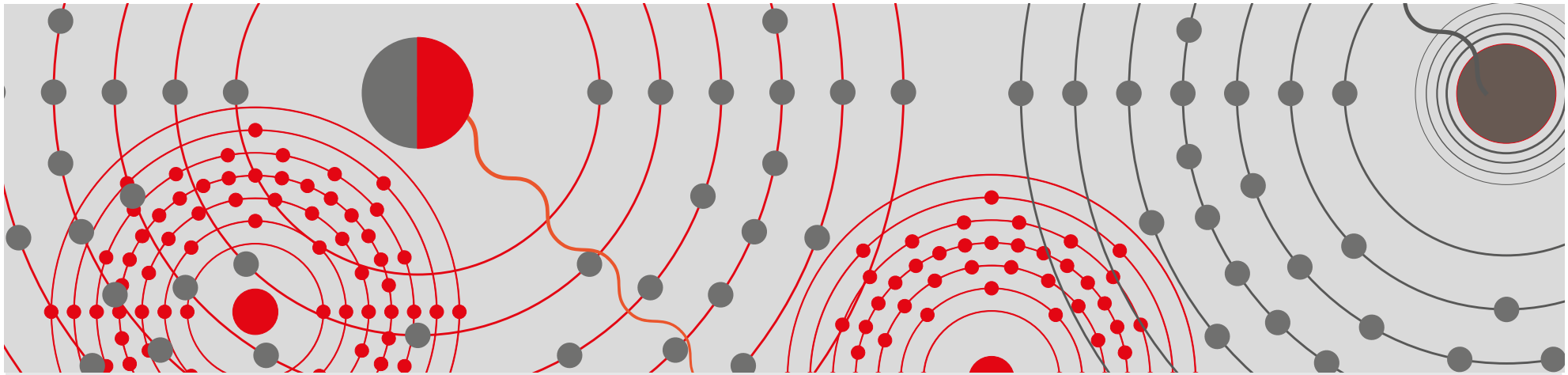


Nano

a nature research solution

让Nature的人工智能数据库助力您的纳米科研工作

巨蓉, Ph.D.
Product Manager, Database Group
2019年6月20日

nature research

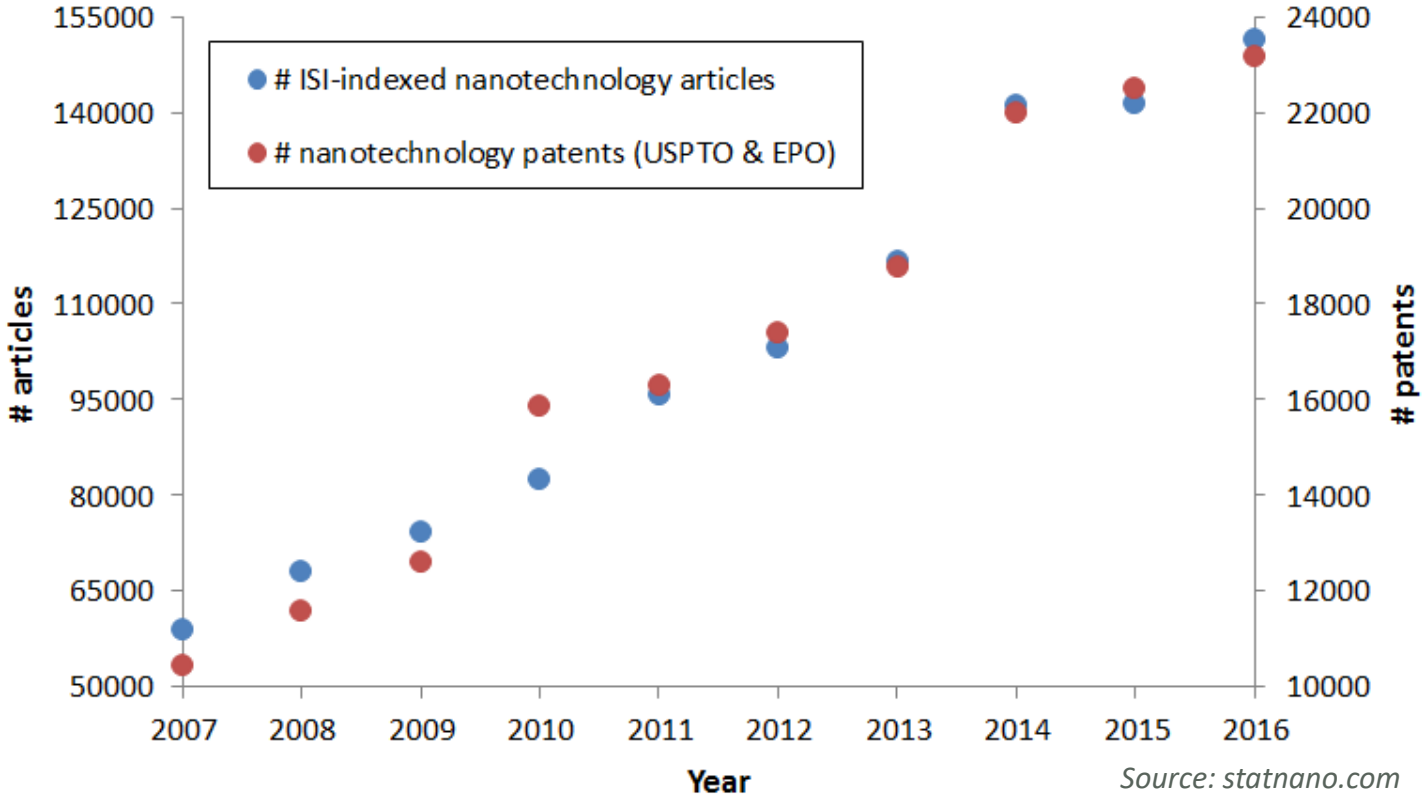
大纲

- Nature Nano 介绍
- Nano数据库内容概览
- 数据库功能与案例演示
- 提问与讨论

SpringerNature的愿景

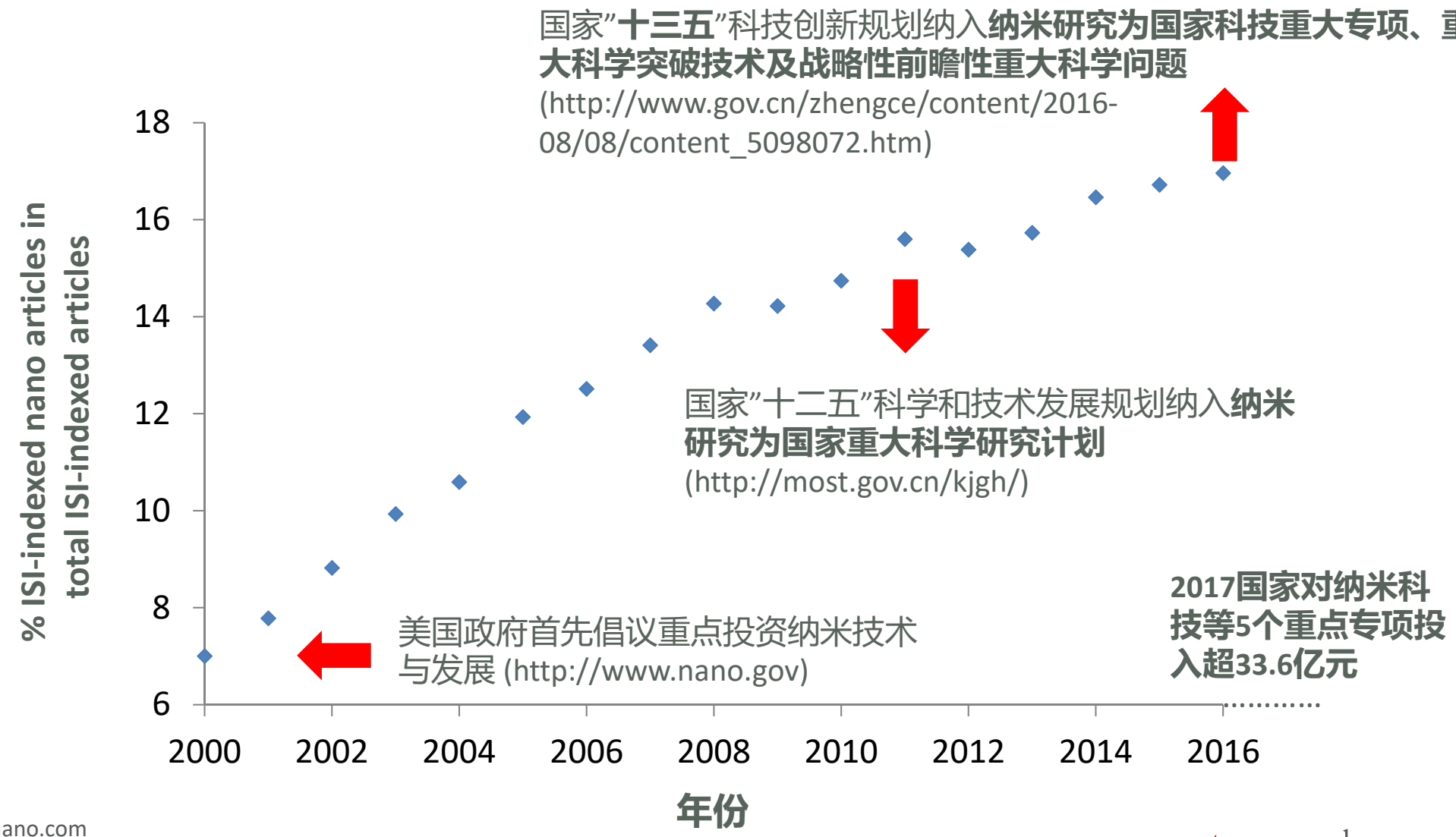
Nature Nano 介绍

纳米科学技术 - 飞速发展的科技领域



- 海量的信息和数据分散在各种期刊和专利之中，为了有效的管理和高效的沟通，亟需对信息进行甄别，分类以及索引。
- 对于“纳米材料”，目前并没有一个标准的术语命名。

纳米科技在国家战略里的重要性

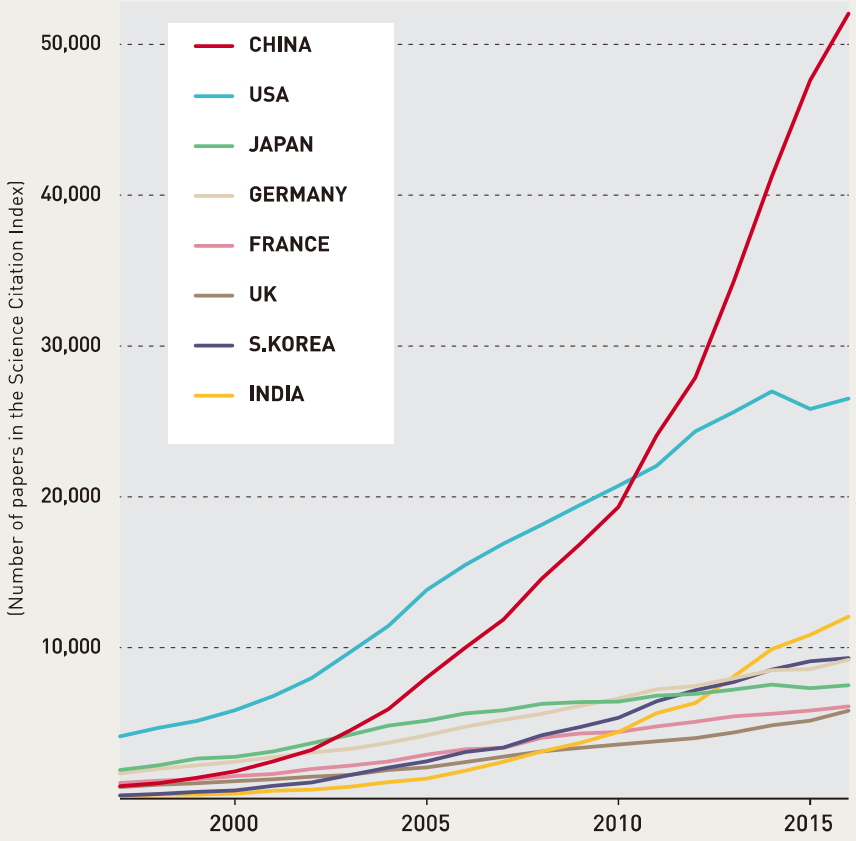


中国纳米科技发展迅速

中国纳米科研已经位居全球第一

FIGURE 1 | GROWTH OF NANOSCIENCE.

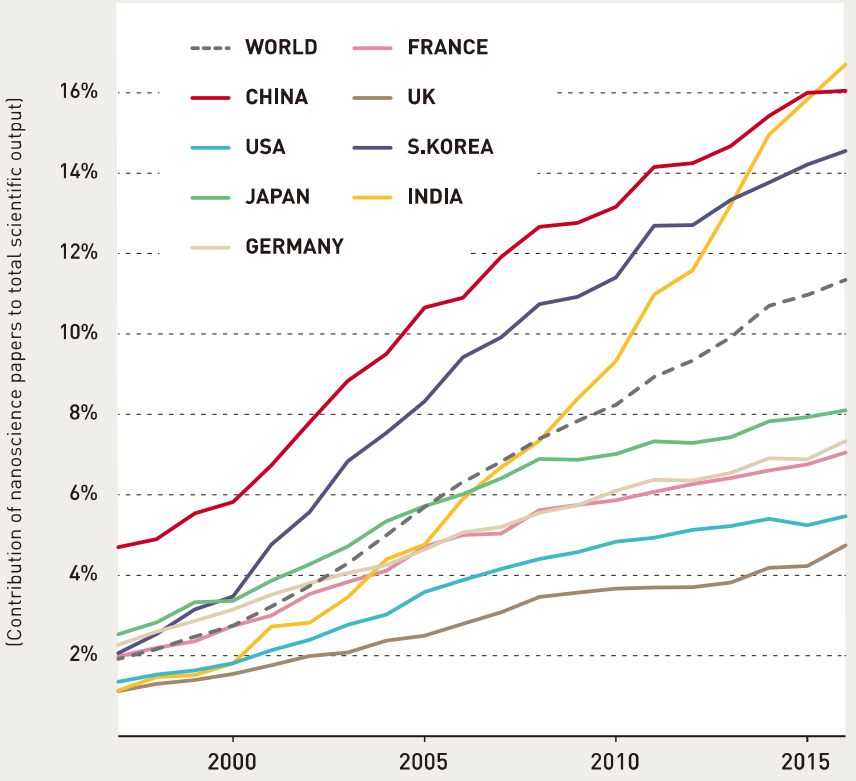
The total output of papers related to nanoscience and technology published in journals listed in the SCI has been growing for the past two decades.



占所有科研领域的比例>16%

FIGURE 2 | CONTRIBUTION OF NANOSCIENCE TO TOTAL SCIENTIFIC OUTPUT.

Papers related to nanoscience and technology represents an ever growing fraction of the total scientific output of most countries. For China, South Korea and India, that fraction is now well above the global average.



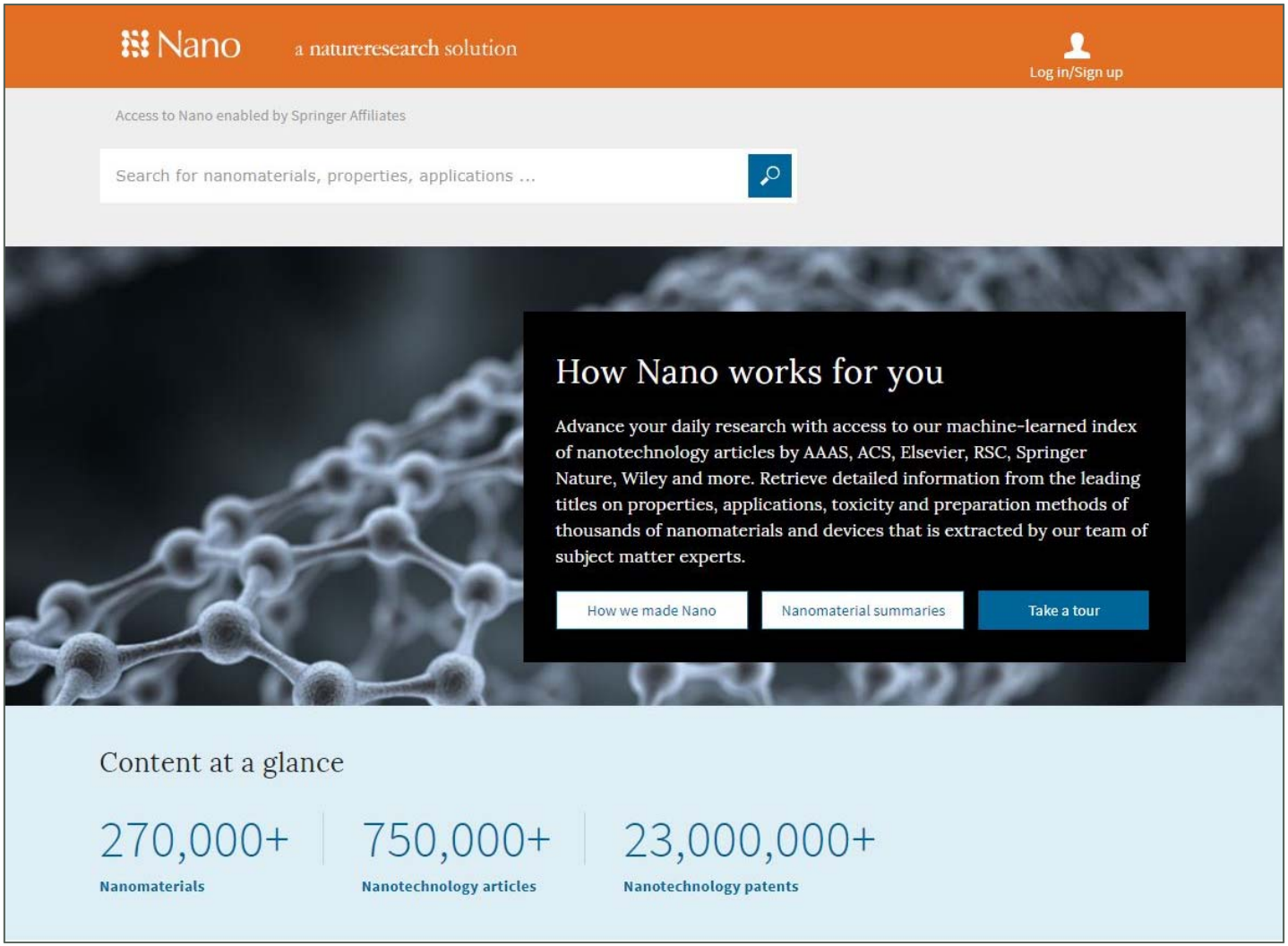
nature research

*中国纳米白皮书：国之大器，始于毫末

纳米科研人员面临的搜索困境

1. 精准度不足：搜索结果大量不相关
2. 耗时费力：确认结果相关性需查看原文
3. 信息分散：海量的相同或相似的纳米材料/器件的信息分散在各种期刊和专利之中
4. 缺少汇总：对某些有相同成分和结构，确定性能或特殊应用的纳米材料没有统一汇总研究结果
5. 缺少合成制备方法的简示：从纳米材料的合成制备方法描述中提取制备的步骤耗时，工作量大并难以辨别与比较
6. 统一搜索平台缺失：无法同时获得纳米科学研究与产业的最新进展

2016年6月15日Nature 正式推出Nano



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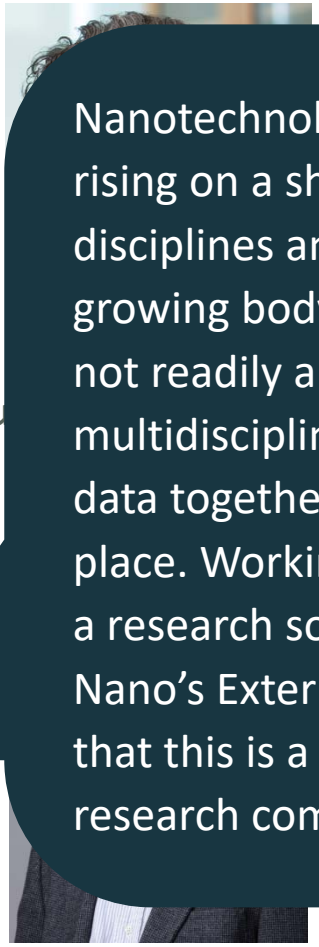

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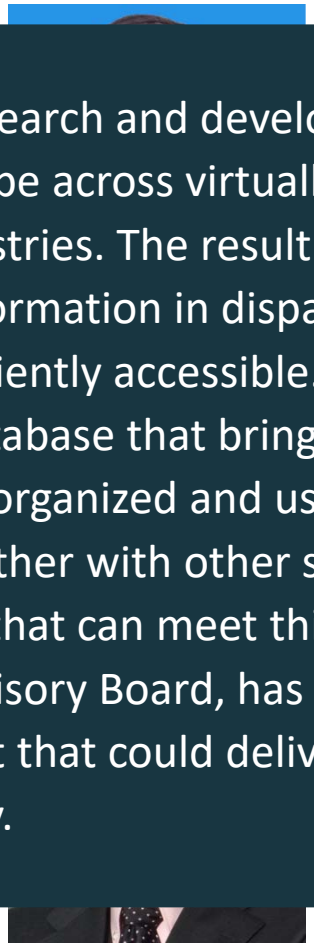

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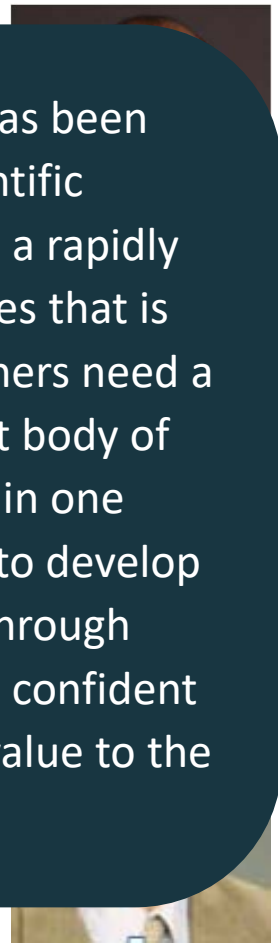
Mat. Sci. and Tech.

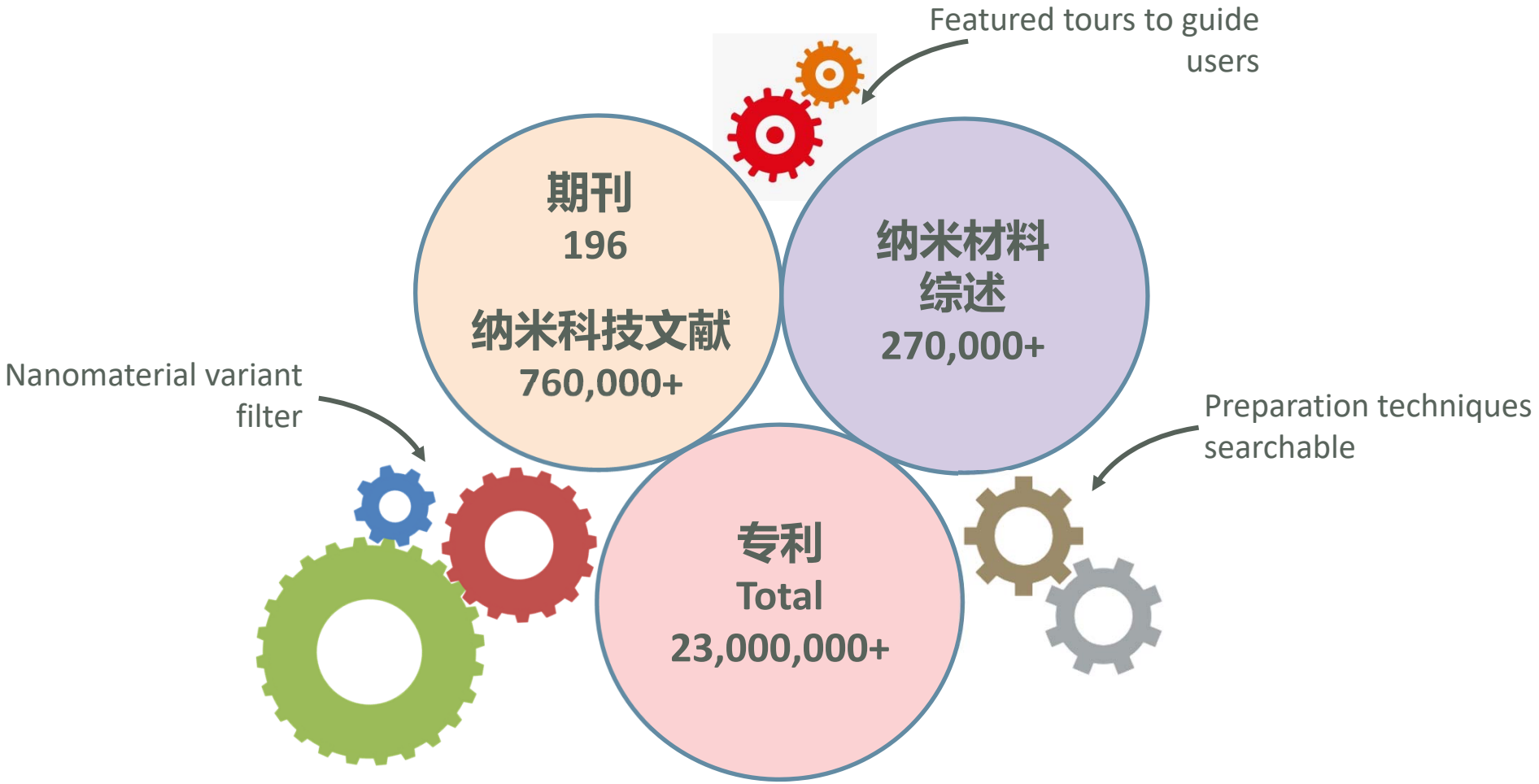


Kuei-Hsien Chen, PhD
Distinguished Research Fellow
& Director
IAMS, Academia Sinica

Nanotechnology research and development has been rising on a sharp slope across virtually all scientific disciplines and industries. The result has been a rapidly growing body of information in disparate places that is not readily and efficiently accessible. Researchers need a multidisciplinary database that brings this vast body of data together in an organized and usable way in one place. Working together with other scientists to develop a research solution that can meet this need, through Nano's External Advisory Board, has made me confident that this is a product that could deliver huge value to the research community.

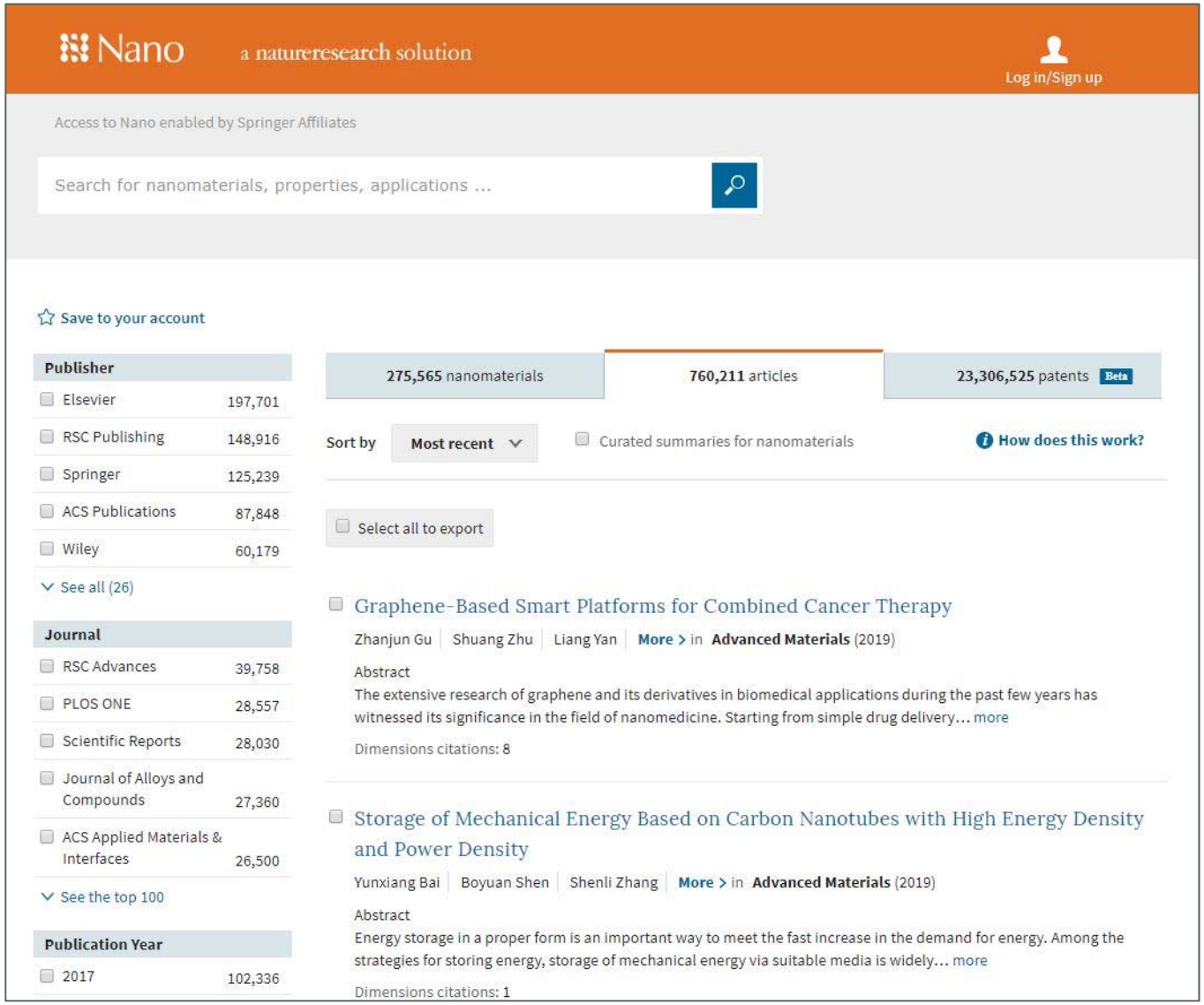
Nano：数据库内容概览

Nano 内容概览



数据库内容和功能持续增加 ...

纳米科技文献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Graphene-Based Smart Platforms for Combined Cancer Therapy
Zhanjun Gu | Shuang Zhu | Liang Yan | More > in Advanced Materials (2019)
Abstract
The extensive research of graphene and its derivatives in biomedical applications during the past few years has witnessed its significance in the field of nanomedicine. Starting from simple drug delivery... more
Dimensions citations: 8
Storage of Mechanical Energy Based on Carbon Nanotubes with High Energy Density and Power Density
Yunxiang Bai | Boyuan Shen | Shenli Zhang | More > in Advanced Materials (2019)
Abstract
Energy storage in a proper form is an important way to meet the fast increase in the demand for energy. Among the strategies for storing energy, storage of mechanical energy via suitable media is widely... more
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Journal selection is mainly based on inputs from research communities and Nature editors

- *ACS Nano,* ACS
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- *Chemistry of Materials,* ACS
- *Journal of the American Chemical Society,* ACS
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- *Nanotoxicology,* Taylor & Francis
- *Nature,* Nature Research
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- *Small,* Wiley

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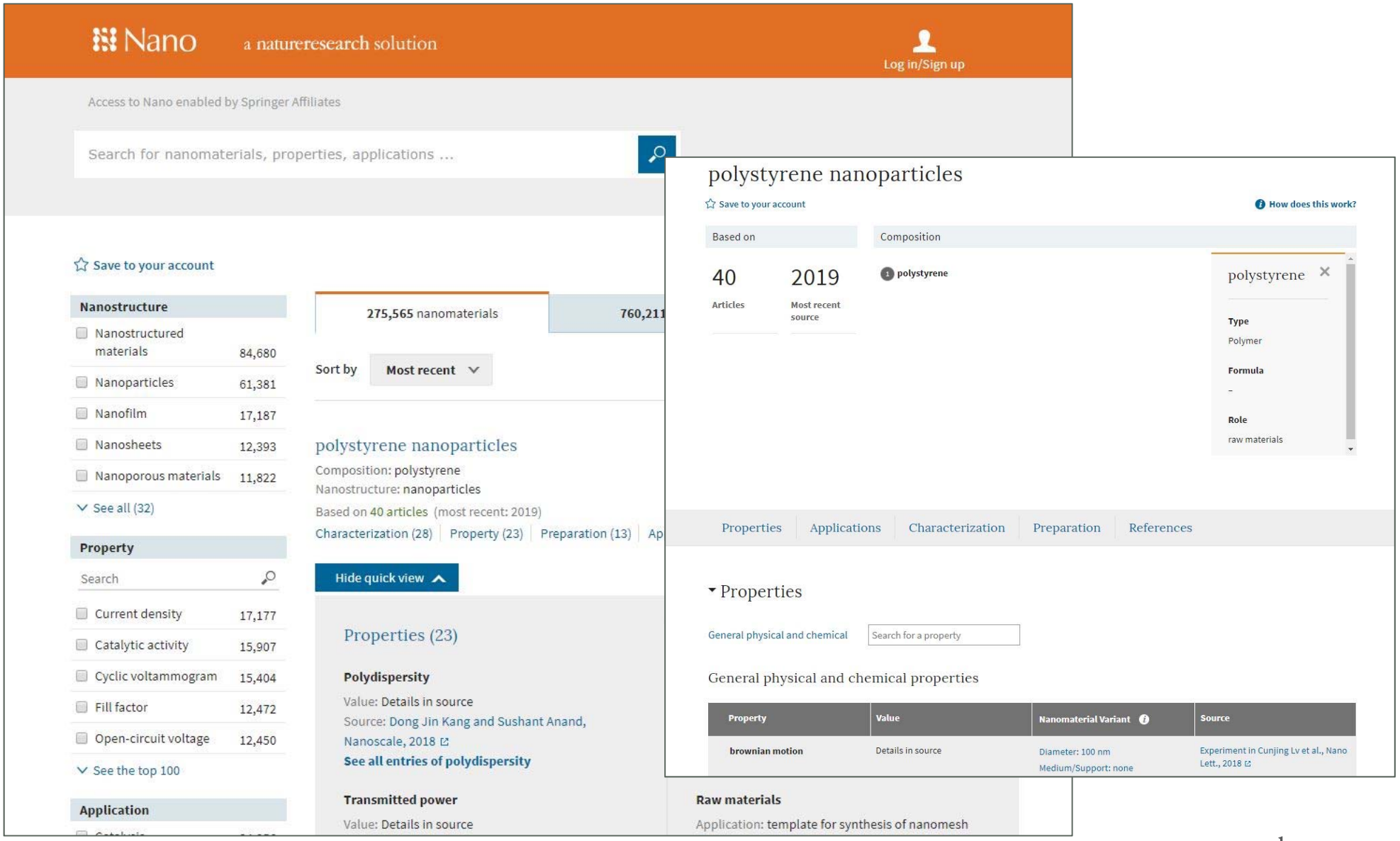
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Application
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polystyrene nanoparticles
Composition: polystyrene
Nanostructure: nanoparticles
Based on 40 articles (most recent: 2019)
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Properties (23)
Polydispersity
Value: Details in source
Source: Dong Jin Kang and Sushant Anand, Nanoscale, 2018
See all entries of polydispersity
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Value: Details in source
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Application: template for synthesis of nanomesh
polystyrene nanoparticles
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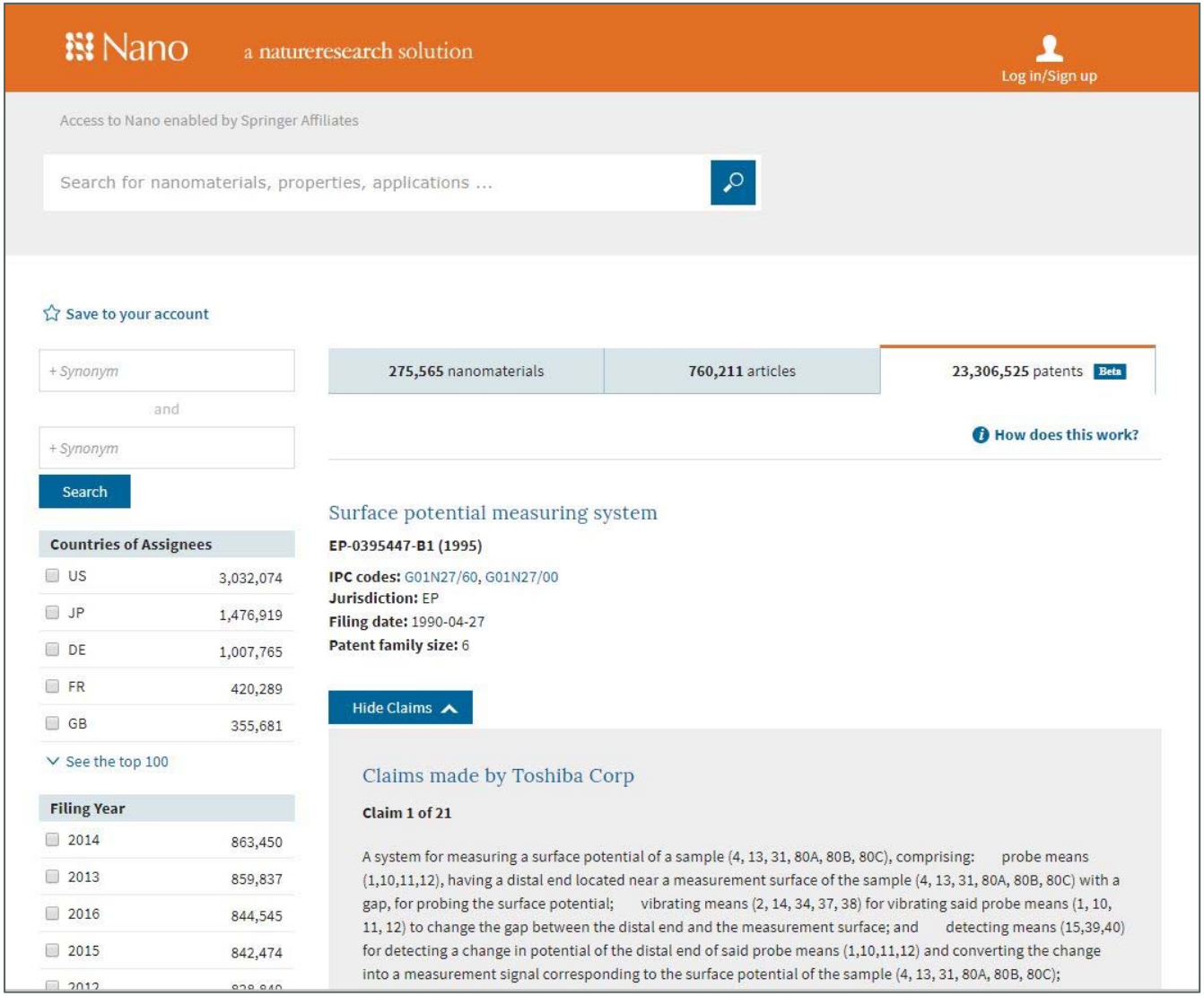
polystyrene
polystyrene
Type
Polymer
Formula
-
Role
raw materials
Properties
Applications
Characterization
Preparation
References
Properties
General physical and chemical
Search for a property
General physical and chemical properties
Property
Value
Nanomaterial Variant
Source
brownian motion
Details in source
Diameter: 100 nm
Medium/Support: none
Experiment in Cunjing Lv et al., Nano Lett., 2018

纳米科技专利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Filing Year
2014 863,450
2013 859,837
2016 844,545
2015 842,474
275,565 nanomaterials
760,211 articles
23,306,525 patents Beta
How does this work?
Surface potential measuring system
EP-0395447-B1 (1995)
IPC codes: G01N27/60, G01N27/00
Jurisdiction: EP
Filing date: 1990-04-27
Patent family size: 6
Hide Claims
Claims made by Toshiba Corp
Claim 1 of 21
A system for measuring a surface potential of a sample (4, 13, 31, 80A, 80B, 80C), comprising: probe means (1,10,11,12), having a distal end located near a measurement surface of the sample (4, 13, 31, 80A, 80B, 80C) with a gap, for probing the surface potential; vibrating means (2, 14, 34, 37, 38) for vibrating said probe means (1, 10, 11, 12) to change the gap between the distal end and the measurement surface; and detecting means (15,39,40) for detecting a change in potential of the distal end of said probe means (1,10,11,12) and converting the change into a measurement signal corresponding to the surface potential of the sample (4, 13, 31, 80A, 80B, 80C);

Nano：功能与案例演示

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6. 统一搜索平台缺失：无法同时获得纳米科学研究与产业的最新进展

根据关键词，全文抓取高度相关的重要信息

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The Light-Induced Field-Effect **Solar Cell** Concept–Perovskite Nanoparticle Coating Introduces Polarization Enhancing Silicon Cell Efficiency

Y Wang, Z Xia, L Liu, W Xu, Z Yuan, Y Zhang... - **Advanced** ..., 2017 - Wiley Online Library

Abstract **Solar cell** generates electrical energy from light one via pulling excited carrier away under built-in asymmetry. Doped semiconductor with antireflection layer is general strategy to achieve this including crystalline silicon (c-Si) **solar cell**. However, loss of extra energy

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Nano

The Light-Induced Field-Effect Solar Cell Concept – Perovskite Nanoparticle Coating Introduces Polarization Enhancing Silicon Cell Efficiency

Yusheng Wang | Zhouhui Xia | Lijia Liu ... in **Advanced Materials** (2017)

Solar cell generates electrical energy from light one via pulling excited carrier away under built-in asymmetry. Doped semiconductor with antireflection layer is general strategy to achieve this including... more

This article discusses: Solar Cell with Perovskite NPs, Power Conversion Efficiency, PSS, c-Si Solar Cell, Sunlight

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全文

显示文章中与搜索关键词
高度相关的重要信息

Showing concepts incl. properties and applications that are closely associated with the search input (e.g. solar cell) from the full text allows users to **gain quick insight specific to the search input and identify the differences among relevant articles without the need to go into the full text** – pain point #2.

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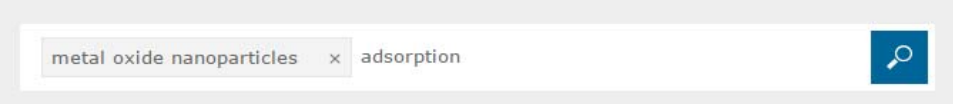


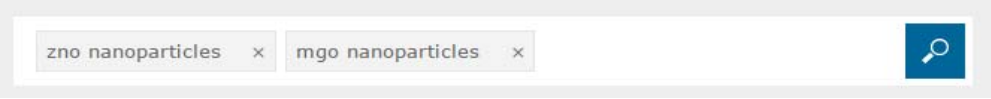
O2 adsorption dependent photoluminescence emission from metal oxide nanoparticles

Amir R. Gheisi | Chris Neygandhi | Andreas K. Sternig ... in **Physical Chemistry Chemical Physics** (2014)

Optical properties of metal oxide nanoparticles are subject to synthesis related defects and impurities. Using photoluminescence spectroscopy and UV diffuse reflectance in conjunction with Auger electron... more

This article discusses: Adsorption with Photoluminescence, Surface, Nanoparticles, Oxygen, MgO Nanoparticles and Metal Oxide Nanoparticles with Photoluminescence, Surface, Annealing, Particle, Oxide Nanoparticle System

Citations according to ReadCube: 13



O2 adsorption dependent photoluminescence emission from metal oxide nanoparticles

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This article discusses: ZnO Nanoparticles with Photoluminescence, Oxygen, Annealing, Surface, Chemical Vapor Synthesis and MgO Nanoparticles with Photoluminescence, Annealing, Surface, Oxygen, ZnO Nanoparticles

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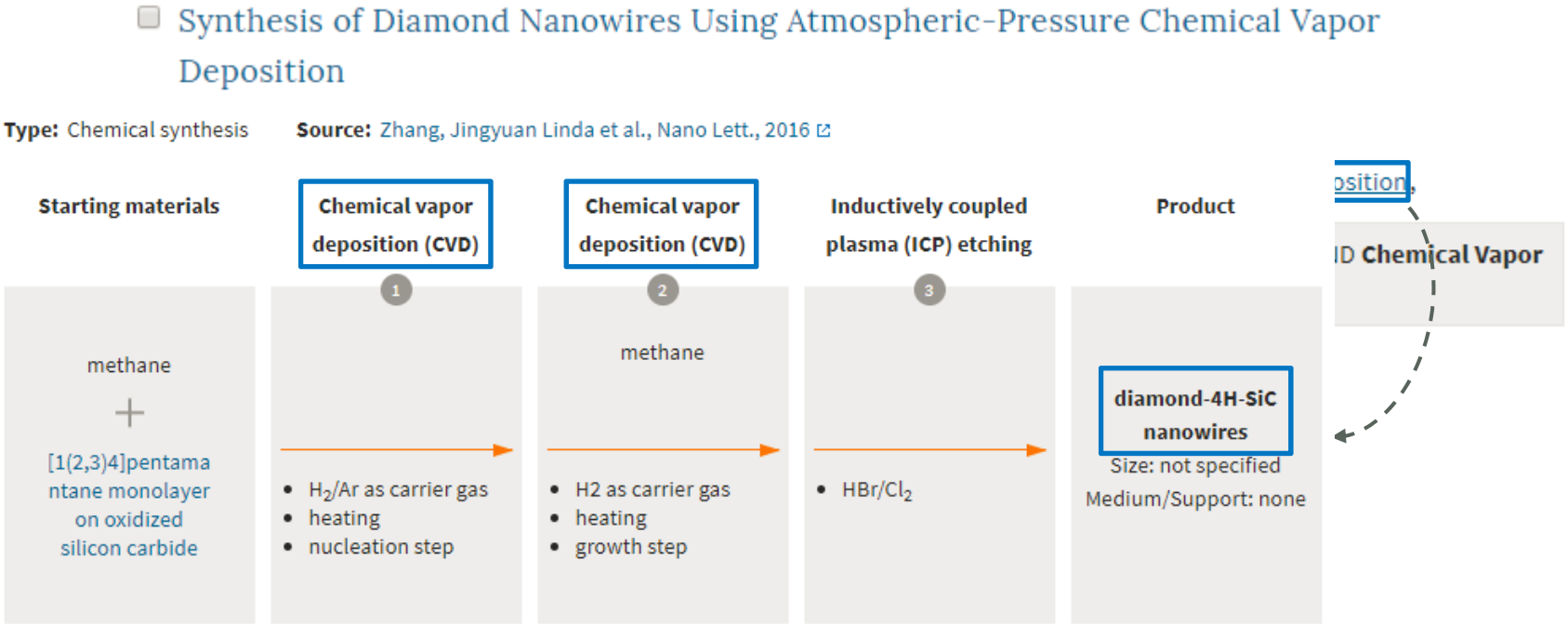

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nanosheets and electrical conductivity

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Synthesis of graphene-based **nanosheets** via chemical reduction of exfoliated graphite oxide
S Stankovich, DA Dikin, RD Piner, KA Kohlhaas... - carbon, 2007 - Elsevier
... Synthesis of graphene-based **nanosheets** via chemical reduction of exfoliated graphite oxide. ... By nature, GO is **electrically** insulating (see below) and thus cannot be used, without further ... Notably, it has been demonstrated that the **electrical conductivity** of GO (and presumably its ...
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Processable aqueous dispersions of graphene **nanosheets**
D Li, MB Müller, S Gilje, RB Kaner... - Nature nanotechnology, 2008 - nature.com
... work may lead to the development of a new generation of antistatic coatings that can combine **electrical conductivity** with transparency ... Synthesis of graphene-based **nanosheets** via chemical reduction of exfoliated graphite oxide. ... **Electric** field effect in atomically thin carbon films. ...
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Preparation and **electrical properties** of graphene **nanosheet**/Al 2 O 3 composites
Y Fan, L Wang, J Li, J Li, S Sun, F Chen, L Chen... - Carbon, 2010 - Elsevier
Fully dense graphene **nanosheet** (GNS)/Al2O3 composites with homogeneously distributed GNSs of thicknesses ranging from 2.5 to 20nm have been fabricated from ball milled expanded graphite and Al2O3 by spark plasma sintering. The percolation threshold of
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Two-dimensional **nanosheets** produced by liquid exfoliation of layered materials
JN Coleman, M Lotya, A O'Neill, SD Bergin... - ..., 2011 - science.sciencemag.org
... Tae Kim. School of **Electrical** Engineering, Korea University, Seoul, South Korea. ... 1 Optical characterization of **nanosheet** dispersions. ... We performed transmission electron microscopy (TEM) analysis on our dispersions, typically observing 2D flakes consisting of thin **nanosheets**. ...
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Comparison of **electrical properties** between multi-walled carbon nanotube and graphene **nanosheet**/high density polyethylene composites with a segregated network ...
J Du, L Zhao, Y Zeng, L Zhang, F Li, P Liu, C Liu - Carbon, 2011 - Elsevier
Multi-walled carbon nanotube (MWCNT)/high density polyethylene (HDPE) and graphene **nanosheets** (GNS)/HDPE composites with a segregated network structure were prepared by alcohol-assisted dispersion and hot-pressing. Instead of uniform dispersion in polymer
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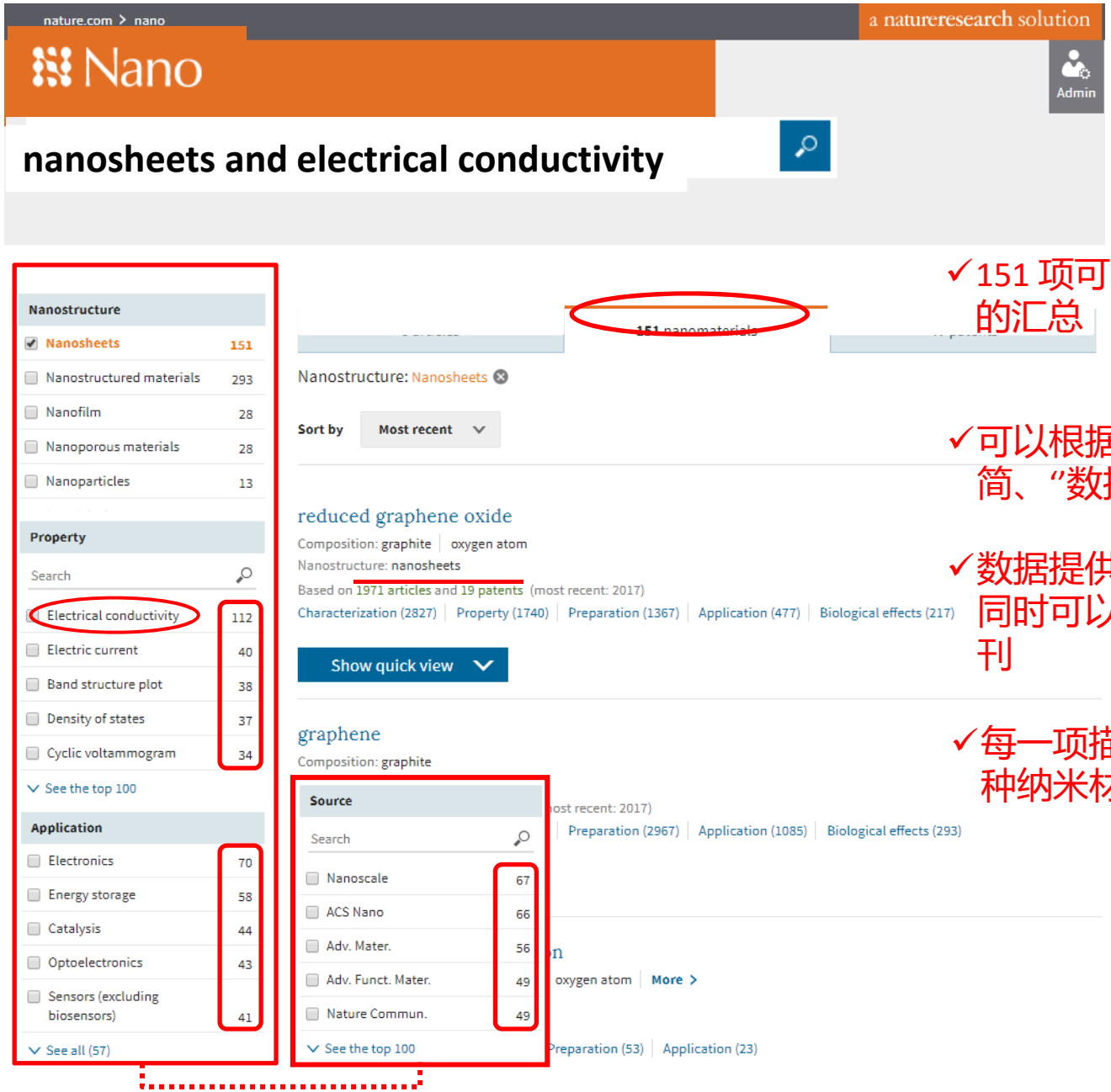

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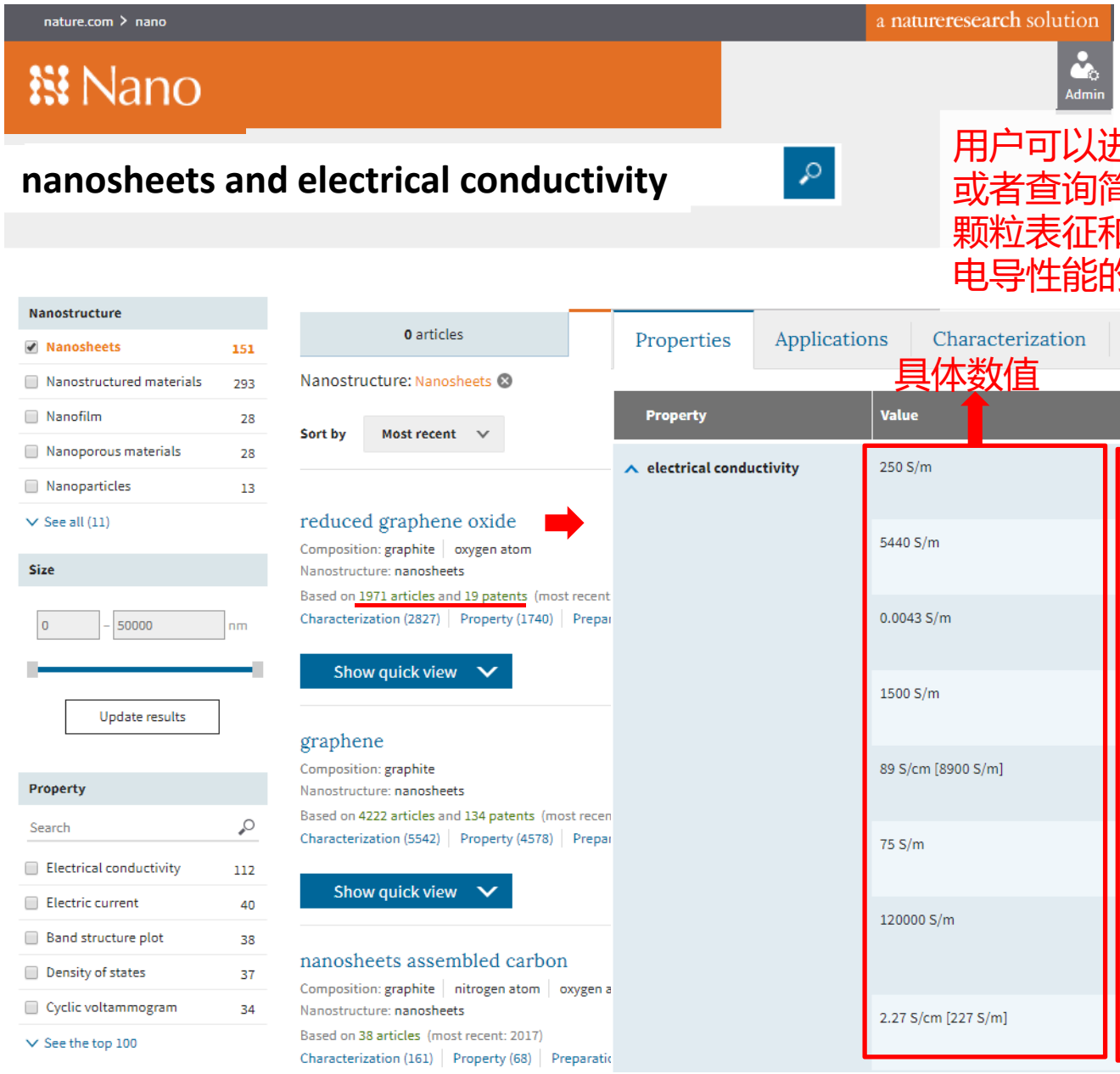
✓数据提供了性能和应用的一个概览，同时可以显示常常发表此类数据的期刊

✓每一项描述来自多种资源但描述同一种纳米材料

Nano普通检索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Composition: graphite | oxygen atom
Nanostructure: nanosheets
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Show quick view
graphene
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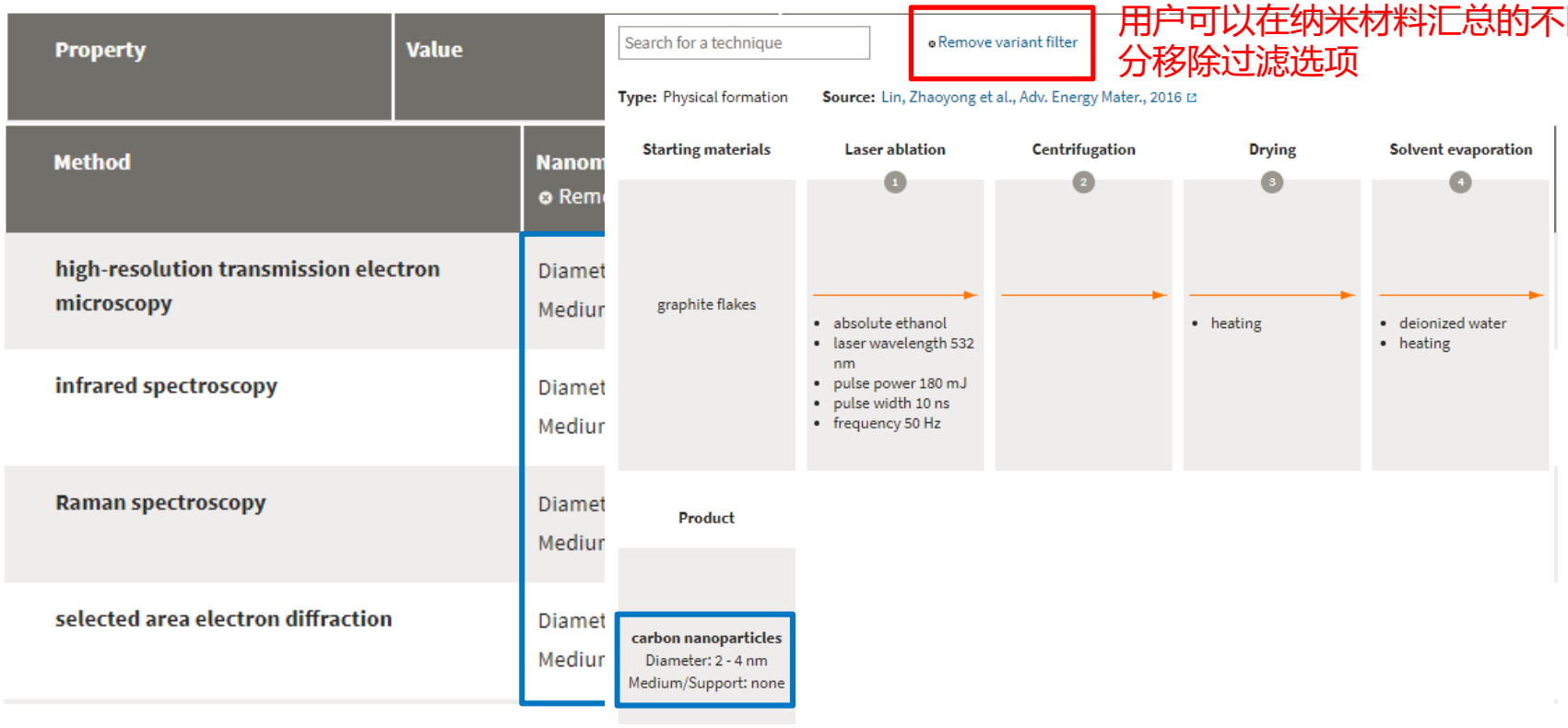
Characterization (5542) | Property (4578) | Prepar
Show quick view
nanosheets assembled carbon
Composition: graphite | nitrogen atom | oxygen a
Nanostructure: nanosheets
Based on 38 articles (most recent: 2017)
Characterization (161) | Property (68) | Preparatic
Properties
Applications
Characterization
Biological effects
Preparation
References
具体数值
样品具体参数
Property
Value
Nanomateri
Variant
Source
electrical conductivity
250 S/m
Thickness: 0.8 nm
Medium/Support: none
Experiment in Liu, Haiqing et al., Adv. Funct. Mater., 2017
5440 S/m
Thickness: ~ 1070 nm
Medium/Support: none
Experiment in Jisoo Park et al., Nanoscale, 2017
0.0043 S/m
Size: not specified
Medium/Support: none
Experiment in L. G. Guex et al., Nanoscale, 2017
1500 S/m
Size: not specified
Medium/Support: none
Experiment in L. G. Guex et al., Nanoscale, 2017
89 S/cm [8900 S/m]
Size: not specified
Medium/Support: none
Experiment in Shuwen Luo et al., Nanoscale, 2017
75 S/m
Size: not specified
Medium/Support: none
Experiment in L. G. Guex et al., Nanoscale, 2017
120000 S/m
Lateral size: ~ 740 nm
Thickness: ~ 232 nm
Medium/Support: none
Experiment in Jisoo Park et al., Nanoscale, 2017
2.27 S/cm [227 S/m]
RMS roughness: 1.2 nm
Medium/Support: none
Experiment in Jung, Chan-Hee et al., Nano Energy, 2017

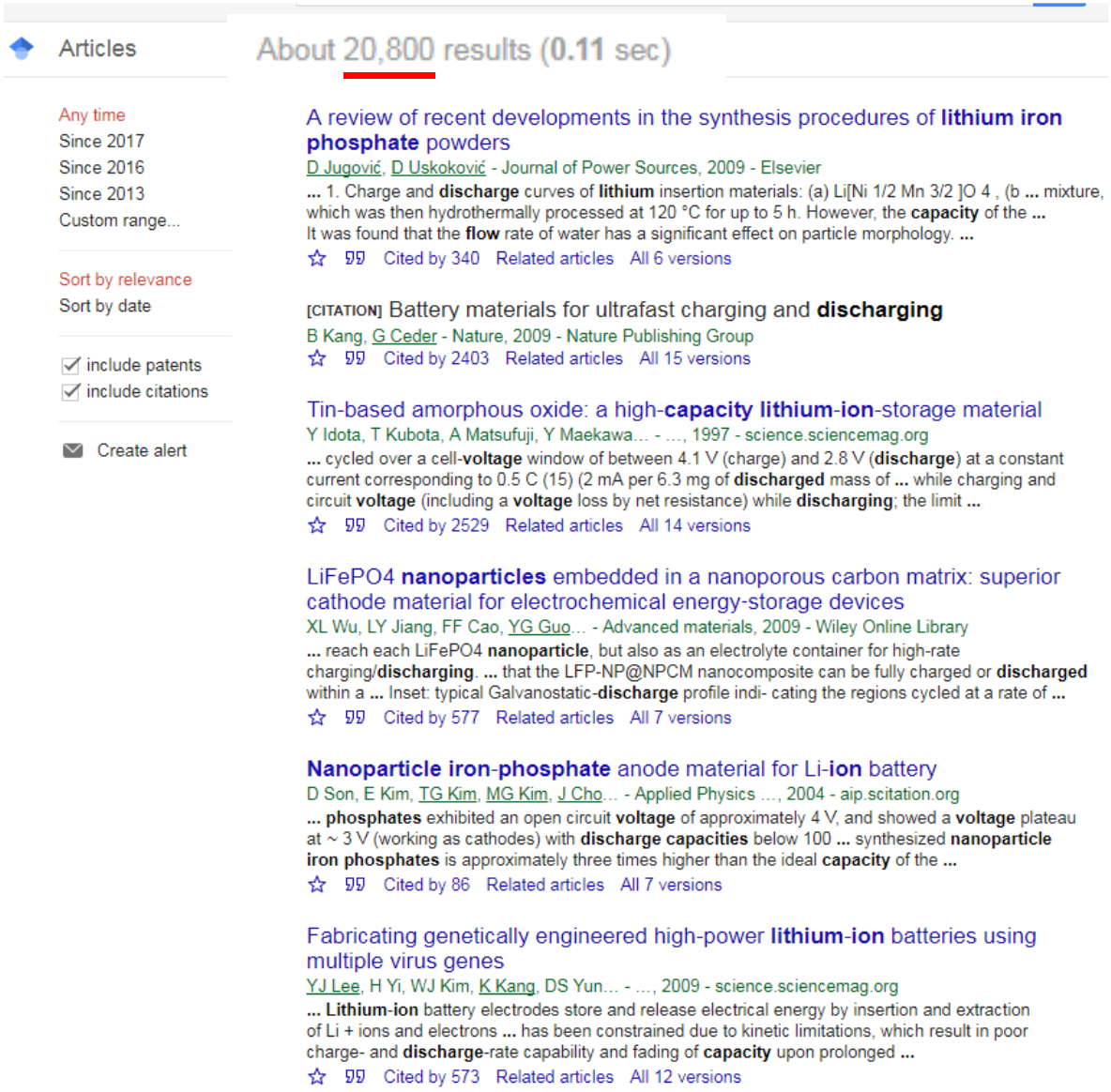
Nano – 最近优化更新：

根据某特定纳米材料的尺度信息获取这一尺寸的纳米材料综述。



案例2— 特定检索

discharge capacity of lithium iron phosphate nanoparticles



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A review of recent developments in the synthesis procedures of **lithium iron phosphate** powders
D Jugović, D Uskoković - Journal of Power Sources, 2009 - Elsevier
... 1. Charge and **discharge** curves of **lithium** insertion materials: (a) Li[Ni 1/2 Mn 3/2]O 4 , (b ... mixture, which was then hydrothermally processed at 120 °C for up to 5 h. However, the **capacity** of the ... It was found that the **flow** rate of water has a significant effect on particle morphology. ...
Cited by 340 Related articles All 6 versions

[CITATION] Battery materials for ultrafast charging and **discharging**
B Kang, G Ceder - Nature, 2009 - Nature Publishing Group
Cited by 2403 Related articles All 15 versions

Tin-based amorphous oxide: a high-**capacity lithium-ion**-storage material
Y Idota, T Kubota, A Matsufuji, Y Maekawa... - ..., 1997 - science.sciencemag.org
... cycled over a cell-**voltage** window of between 4.1 V (charge) and 2.8 V (**discharge**) at a constant current corresponding to 0.5 C (15) (2 mA per 6.3 mg of **discharged** mass of ... while charging and circuit **voltage** (including a **voltage** loss by net resistance) while **discharging**; the limit ...
Cited by 2529 Related articles All 14 versions

LiFePO4 **nanoparticles** embedded in a nanoporous carbon matrix: superior cathode material for electrochemical energy-storage devices
XL Wu, LY Jiang, FF Cao, YG Guo... - Advanced materials, 2009 - Wiley Online Library
... reach each LiFePO4 **nanoparticle**, but also as an electrolyte container for high-rate charging/**discharging**. ... that the LFP-NP@NPCM nanocomposite can be fully charged or **discharged** within a ... Inset: typical Galvanostatic-**discharge** profile indi- cating the regions cycled at a rate of ...
Cited by 577 Related articles All 7 versions

Nanoparticle iron-phosphate anode material for Li-**ion** battery
D Son, E Kim, TG Kim, MG Kim, J Cho... - Applied Physics ..., 2004 - aip.scitation.org
... **phosphates** exhibited an open circuit **voltage** of approximately 4 V, and showed a **voltage** plateau at ~ 3 V (working as cathodes) with **discharge capacities** below 100 ... synthesized **nanoparticle iron phosphates** is approximately three times higher than the ideal **capacity** of the ...
Cited by 86 Related articles All 7 versions

Fabricating genetically engineered high-power **lithium-ion** batteries using multiple virus genes
YJ Lee, H Yi, WJ Kim, K Kang, DS Yun... - ..., 2009 - science.sciencemag.org
... **Lithium-ion** battery electrodes store and release electrical energy by insertion and extraction of Li + ions and electrons ... has been constrained due to kinetic limitations, which result in poor charge- and **discharge**-rate capability and fading of **capacity** upon prolonged ...
Cited by 573 Related articles All 12 versions

关联性

不对

不对

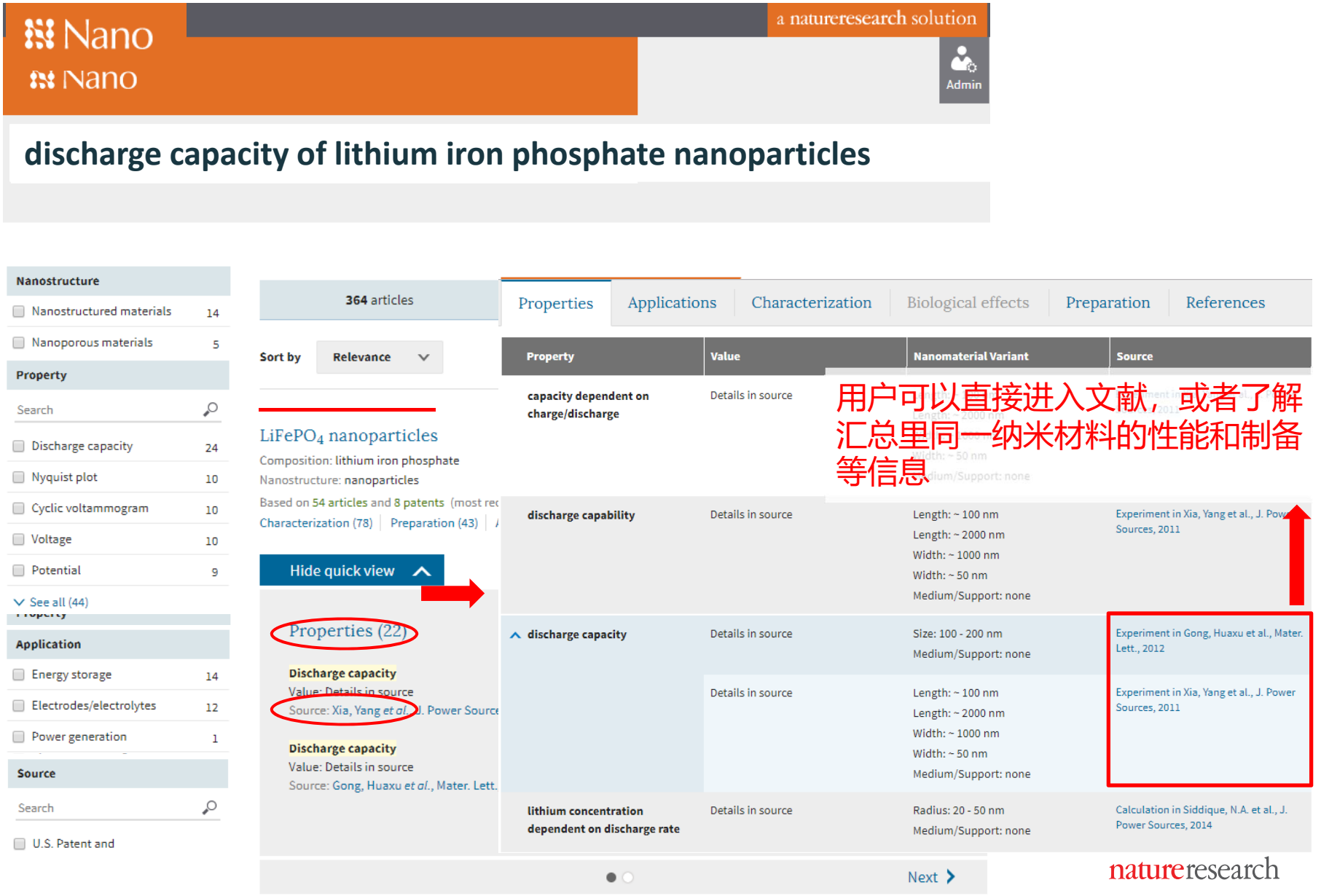
不确定

可能

不确定

不太可能

Nano特定检索


Nano
Nano
a natureresearch solution
Admin
discharge capacity of lithium iron phosphate nanoparticles
Nanostructure
Nanostructured materials 14
Nanoporous materials 5
Property
Search
Discharge capacity 24
Nyquist plot 10
Cyclic voltammogram 10
Voltage 10
Potential 9
See all (44)
Application
Energy storage 14
Electrodes/electrolytes 12
Power generation 1
Source
Search
U.S. Patent and
364 articles
Sort by Relevance
LiFePO4 nanoparticles
Composition: lithium iron phosphate
Nanostructure: nanoparticles
Based on 54 articles and 8 patents (most rec
Characterization (78) | Preparation (43) |
Hide quick view
Properties (22)
Discharge capacity
Value: Details in source
Source: Xia, Yang et al. J. Power Source
Discharge capacity
Value: Details in source
Source: Gong, Huaxu et al., Mater. Lett.
Properties
Applications
Characterization
Biological effects
Preparation
References
Property
Value
Nanomaterial Variant
Source
capacity dependent on charge/discharge
Details in source
discharge capability
Details in source
Length: ~ 100 nm
Length: ~ 2000 nm
Width: ~ 1000 nm
Width: ~ 50 nm
Medium/Support: none
Experiment in Xia, Yang et al., J. Pow
Sources, 2011
discharge capacity
Details in source
Size: 100 - 200 nm
Medium/Support: none
Experiment in Gong, Huaxu et al., Mater. Lett., 2012
Details in source
Length: ~ 100 nm
Length: ~ 2000 nm
Width: ~ 1000 nm
Width: ~ 50 nm
Medium/Support: none
Experiment in Xia, Yang et al., J. Power Sources, 2011
lithium concentration dependent on discharge rate
Details in source
Radius: 20 - 50 nm
Medium/Support: none
Calculation in Siddique, N.A. et al., J. Power Sources, 2014
Next
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natureresearch

纳米材料综述- 快速掌握汇总自各篇文献的“性质”信息

gold nanoparticles

Composition: gold

Nanostructure: nanoparticles

Based on 3710 articles and 113 patents (most recent: 2017)

Characterization (3432) | Preparation (2451) | Property (1871) | Application (871) | Biological effects (724)

▾ Properties

Search for a property

General physical and chemical properties

Property	Value	Nanomaterial Variant	Source
⌄ **1,4-aminothiophenol detection analytical enhancement factor**	Details in source	Size: 30 - 60 nm Tip size: 20 nm Medium: water Support: none	Experiment in Boris Khlebtsov et al., J. Nanopart. Res., 2014
1,4-aminothiophenol detection limit	Details in source	Core size: 100 nm Size: 130 - 170 nm Tip size: 30 nm Medium: water Support: none	Experiment in Boris Khlebtsov et al., J. Nanopart. Res., 2014
100/111 surface energy ratio	Details in source	Size: 1 - 2 nm Medium/Support: none	Calculation in Almora-Barrios, Neyvis et al., Nano Lett., 2014
110/111 surface energy ratio	Details in source	Size: 1 - 2 nm Medium/Support: none	Calculation in Almora-Barrios, Neyvis et al., Nano Lett., 2014
⌄ **absorbance**	Details in source	Diameter: ~ 15.11 - 29.67 nm Medium: water Support: none	Experiment in Duy, Janice et al., J. Nanopart. Res., 2010

纳米材料综述- 快速掌握汇总自各篇文献的“应用”信息

gold nanoparticles

Composition: gold

Nanostructure: nanoparticles

Based on 3710 articles and 113 patents (most recent: 2017)

Characterization (3432) | Preparation (2451) | Property (1871) | Application (871) | Biological effects (724)

Applications

Search for an application area

Area	Application	Nanomaterial Variant	Source
agrochemicals	Gloriosa superba seed germination	Size: 5 - 50 nm Medium: Terminalia arjuna extract Support: none	Confirmed in K. Gopinath et al., J. Nanostruct. Chem., 2014
analysis methods	substrate for surface-enhanced Raman scattering (SERS)	Diameter: 39.5 - 75.5 nm Medium/Support: none	Confirmed in Tian, Shu et al., Nano Lett., 2017
catalysis	interfacial catalytic reactions	Core diameter: 65 nm Diameter: ~ 75 nm Spine bottom diameter: 15 nm Spine length: 5 nm Spine top diameter: 5 nm Medium/Support: none	Confirmed in Dan Wang et al., Nanoscale, 2017
coatings	plasmonic substrate	Diameter: 20 - 40 nm Interparticle distance: 5 - 10 nm Medium/Support: none	Confirmed in Lin, Linhan et al., ACS Nano, 2016
cosmetics/sunscreens/lotions	cosmetology	Size: not specified Medium: hydrogen chloride aqueous solution Support: none	Proposed in Anna Dzimitrowicz et al., J. Nanopart. Res., 2015

纳米材料综述- 快速掌握汇总自各篇文献的“表征”信息

gold nanoparticles

Composition: gold

Nanostructure: nanoparticles

Based on 3710 articles and 113 patents (most recent: 2017)

Characterization (3432) | Preparation (2451) | Property (1871) | Application (871) | Biological effects (724)

Characterization

Search for a method

Method	Nanomaterial Variant	Source
alternating current	Diameter: ~ 20 nm Medium/Support: none	Experiment in Johannes Walter et al., Nanoscale, 2015
Analytical centrifugation	Diameter: ~ 20 nm Medium/Support: none	Experiment in Johannes Walter et al., Nanoscale, 2015
atomic absorption spectroscopy	Radius: 5 nm Medium/Support: none	Calculation in Yu Luo et al., Proc. Natl. Acad. Sci. USA, 2014
atomic force microscopy	Size: ~ 20 nm Medium/Support: none	Experiment in Satish K. Tuteja et al., Nanoscale, 2017
cathodoluminescence spectroscopy	Edge: 50 nm Thickness: 50 nm Medium/Support: none	Calculation in Losquin, Arthur et al., Nano Lett., 2015

纳米材料综述- 快速掌握汇总自各篇文献的“生物相容性”

gold nanoparticles

Composition: gold

Nanostructure: nanoparticles

Based on 3710 articles and 113 patents (most recent: 2017)

Characterization (3432) | Preparation (2451) | Property (1871) | Application (871) | Biological effects (724)

Biological effects

Search for a biological system

Biological system	Test details	Nanomaterial Variant	Source
3-D mouse kidney proximal tubule culture	nontoxic	Size: not specified Medium/Support: none	Astashkina, Anna I. et al., Biomaterials, 2014
3T3-L1 cells	noncytotoxic	Diameter: 25 nm Medium/Support: none	Park, Hyejin et al., Biomaterials, 2014
4T1 cells	noncytotoxic	Diameter: 80 nm Medium/Support: none	Liu, Zhen et al., Biomaterials, 2014
4T1 tumor-bearing athymic female BALB/c nude mouse	no effect on body weight, intravenous (iv)	Size: not specified Medium/Support: none	Du, Yang et al., Adv. Mater., 2016
4T1-fLuc tumor cells	cytotoxic upon NIR laser irradiation	Size: not specified Medium/Support: none	Du, Yang et al., Adv. Mater., 2016

纳米材料综述- 快速掌握汇总自各篇文献的“制备方法”

gold nanoparticles

Composition: gold

Nanostructure: nanoparticles

Based on 3710 articles and 11

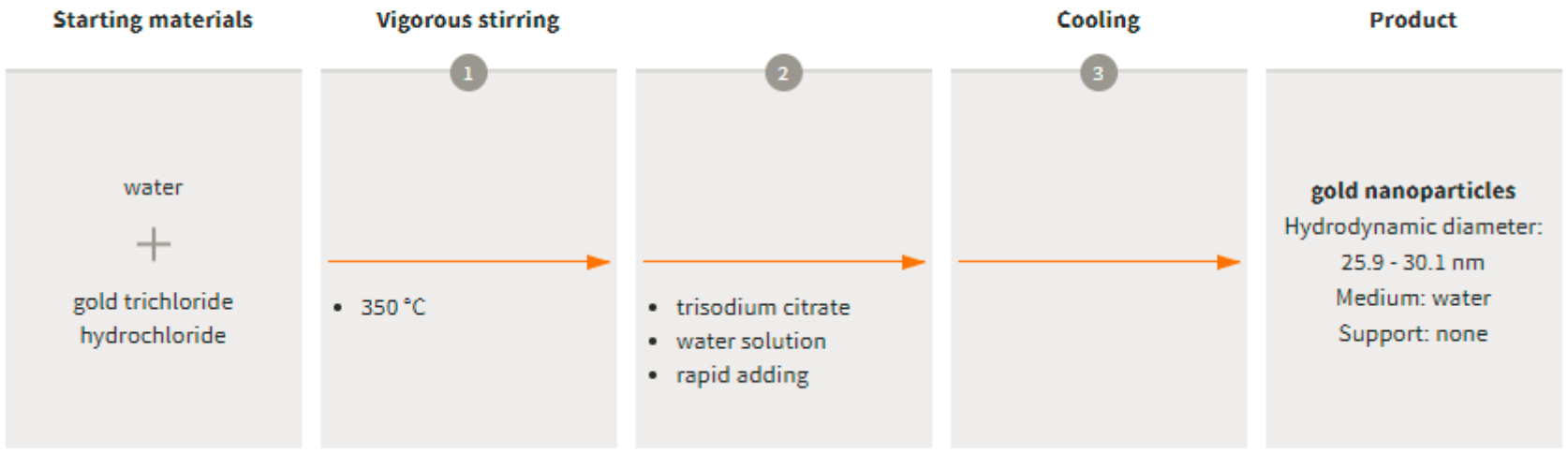
Characterization (3432) | Pre

4.2. Synthesis of gold nanoparticles

AuNPs (20 ± 3 nm; Fig. S12B†) were prepared with the sodium citrate method.[43,48] $HAuCl_4$ (1.25 mL, 4 g L^{-1}) was added into 48.75 mL of ultrapure water with vigorous stirring, and boiled at a high temperature (350 °C). After several minutes, freshly prepared aqueous trisodium citrate solution (1.2 mL, 10 mg mL^{-1}) was added rapidly. After the color of the solution had stabilized, the reaction solution was cooled to room temperature and then stored at 4 °C.

Preparation

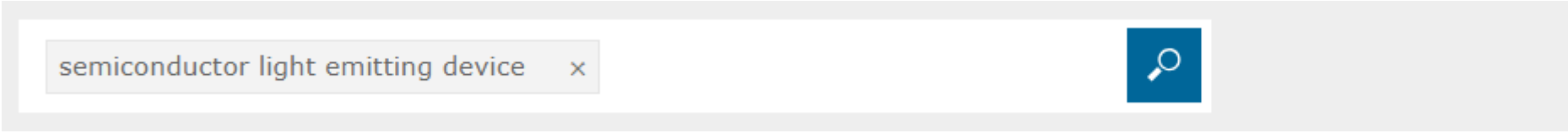
Type: Chemical synthesis **Source:** Aihua Qu et al., Nanoscale, 2017



科研人员面临的搜索困境

1. 精准度不足：搜索结果大量不相关
2. 耗时费力：确认结果相关性需查看原文
3. 信息分散：相同或相似的纳米材料/器件的信息分散
4. 缺少汇总：对默写确定性或特殊应用的纳米材料没有统一汇总研究结果
5. 缺少合成制备方法的简示：从纳米材料的合成制备方法描述中提取制备的步骤耗时，工作量大并难以辨别与比较
6. **统一搜索平台缺失：无法同时获得纳米科学研究与产业的最新进展**

特有专利文献综述同步检索



Semiconductor light emitting structure and method of manufacturing the same

KR-20170061224-A (2017)

IPC codes: H01L25/075, H01L33/48, H01L33/36, H01L33/52, H01L33/46
Jurisdiction: KR
Filing date: 2015-11-25
Patent family size: 2

A semiconductor light emitting device comprising: a first electrode, a second electrode, a first semiconductor light emitting device chip including an active layer, and a third electrode, a fourth electrode,... more

Evaluate by claims

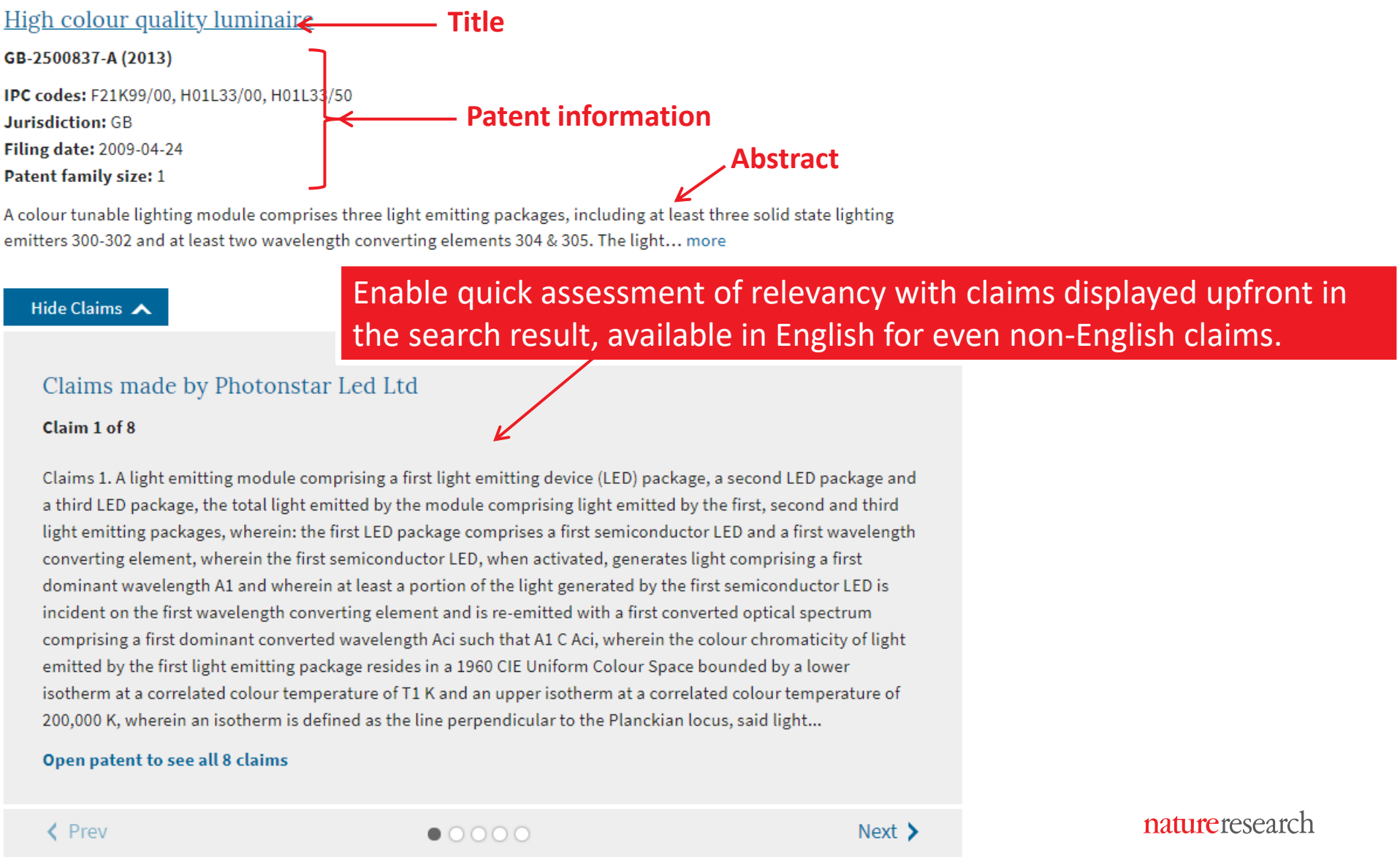
Incorporate Patent search into the research workflow increases the commercialization potential of their research results.

Semiconductor light emitting device

KR-101806789-B1 (2017)

IPC codes: H01L33/50, H01L25/075, H01L33/36
Jurisdiction: KR
Filing date: 2015-11-25

通过对著录信息的评估提供高度相关的搜索结果



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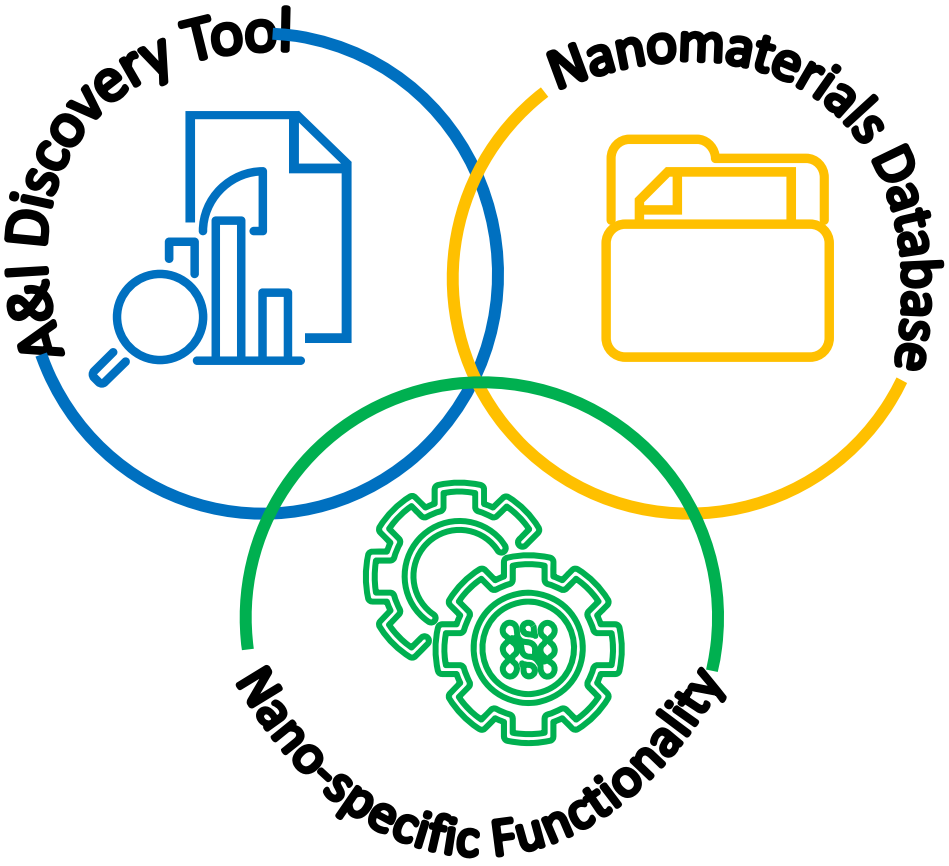
- 利用人工智能快速获得纳米科技相关专利，加速科技转化



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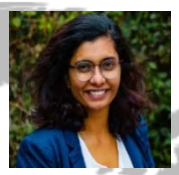

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