

There is something about Patent

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WHAT ARE PATENTS GOOD FOR?



MARKET RESEARCH?



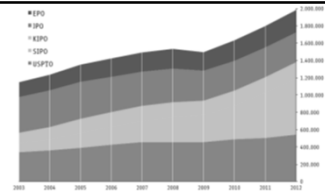
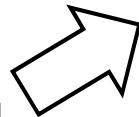
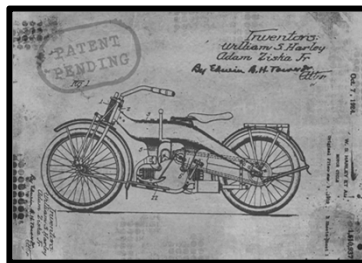
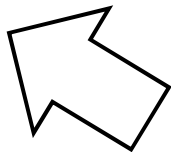
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REALLY?



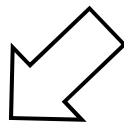
>105 millions



60% increase in the past 10 years




80 % of the information




- SUBJECT
- INVENTOR
- APPLICANT
- DATE
- CPC
-


PATENT CAN GIVE YOU INFORMATION ON:




TRENDS




COMPETITORS




COLLABORATIONS



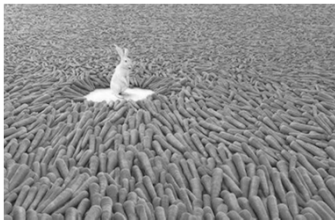
BUT LET FACE IT




Technical Language



Lengthy



Abundant



WHERE TO SEARCH FOR PATENTS?



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USPTO PATENT FULL-TEXT AND IMAGE DATABASE

Home | Quick | Advanced | Pat. Num | Help

View Cart

Data current through October 17, 2017..

Query [Help]

Term 1: in Field 1: All Fields

AND

Term 2: in Field 2: All Fields

Select years [Help]

(1970 to present [Full-Text])

Search [Reset]

Patents from 1790 through 1973 are searchable only by Issue Date, Patent Number, and Current US CI

When searching for specific numbers in the Patent Number field, patent numbers must be seven characters in length, except

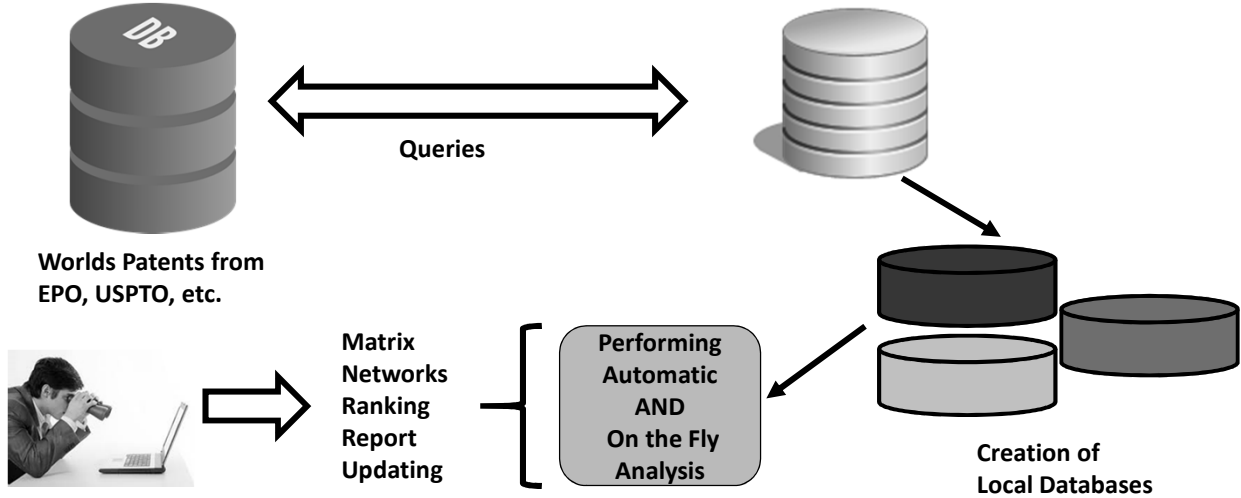


PAT. NO.	Title
1 D800,099	RFID antenna
2 D800,098	RFID antenna
3 9,793,693	Parametric in-coupled impedance matching device
4 9,793,003	Quasi-optical coupler
5 9,793,973	Core feeding resonating repeater and method for manufacturing of the same
6 9,793,915	Passive electrical coupling device and methods for use thereon
7 9,793,954	Magnetic coupling device and methods for use thereon
8 9,793,951	Method and apparatus for launching a wave mode that mitigates interference
9 9,793,827	Integrated bulk acoustic wave (BAW) resonator device
10 9,793,769	Wireless power distribution systems and methods
11 9,793,681	Semiconductor laser device
12 9,793,577	Organic-acid derivatives as additives for electrolytes in lithium ion batteries
13 9,793,566	Aqueous electrolytes for redox flow battery systems
14 9,793,548	Method of depositing nanoscale materials within a nanofiber network and networked nanofibers with coating
15 9,793,543	Battery including beta-dicalcium layered nickel oxide electrochemically active cathode material
16 9,793,542	Beta-dicalcium layered nickel oxide electrochemically active cathode material and a battery including said material
17 9,793,541	Composite silicon or composite tin particles
18 9,793,536	Pellet form cathode for use in a biocompatible battery

Automatic Patent Analysis (APA)



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Automatic Patent Analysis (APA)

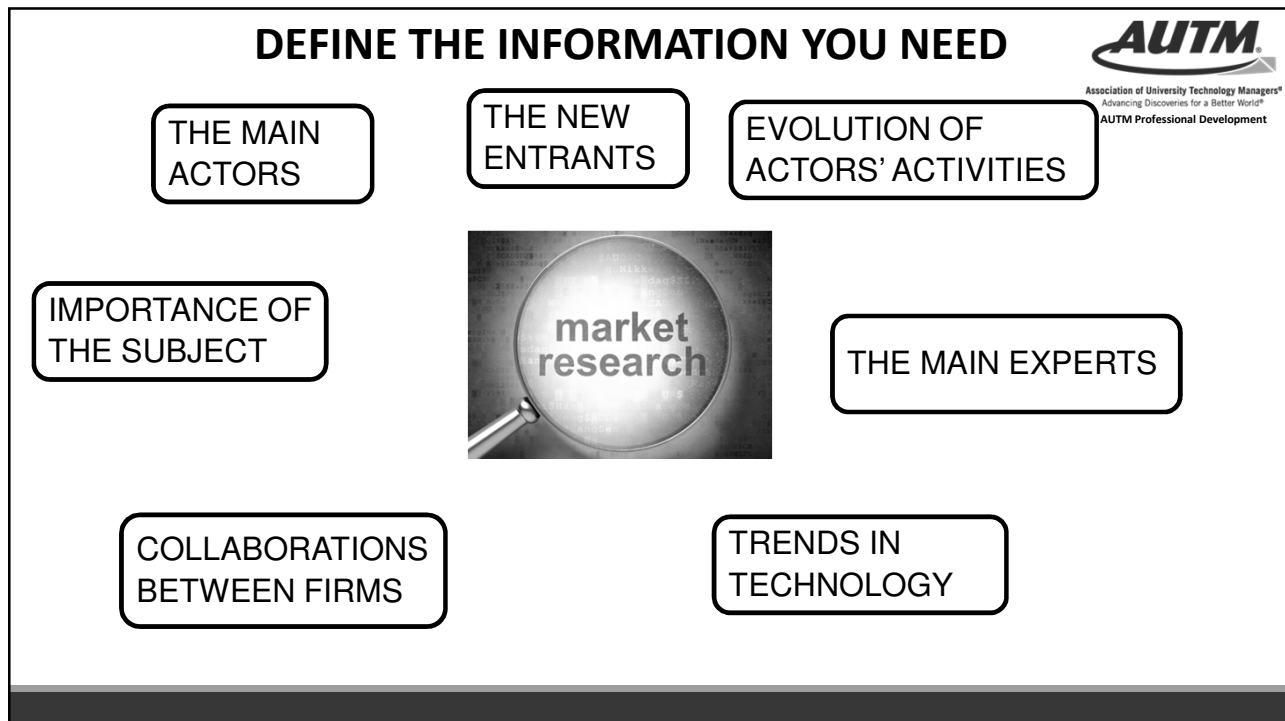
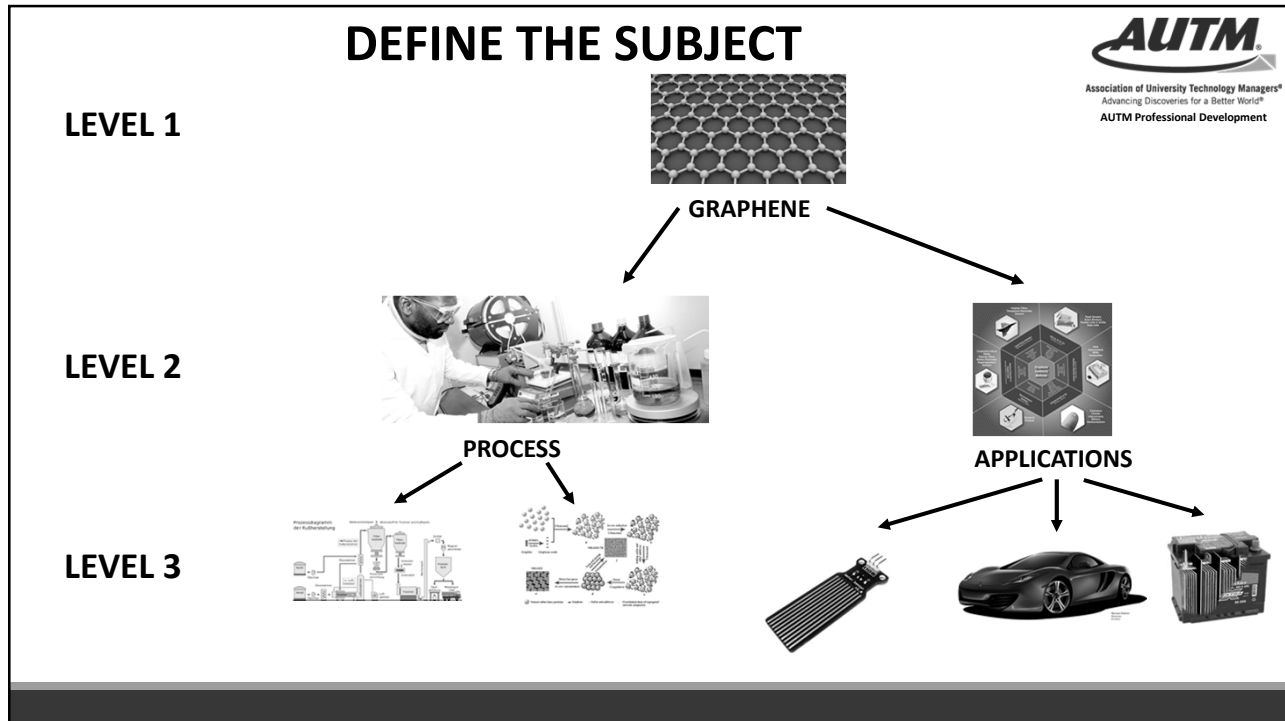


2 Philosophies



Where do I start?

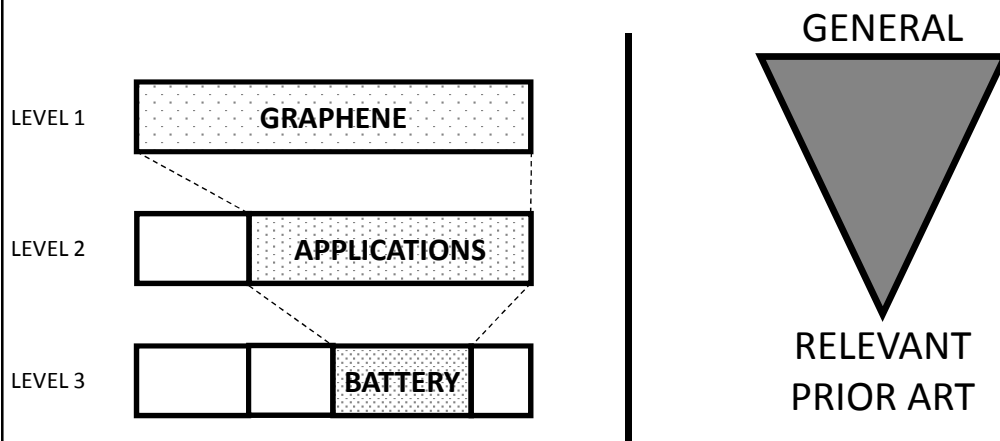






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MARKET SEARCH ≠ PATENT SEARCH



GOAL

GATHER MARKET INFORMATION
RELATED TO THE USE OF
GRAPHENE IN BATTERY



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FIRST STEP



GATHER THE PATENTS RELATED TO THE SUBJECT:

THE USE OF GRAPHENE (LEVEL 1)
IN BATTERY (LEVEL 2-3)

THE MIX SEARCH



PATENT CLASSIFICATION

IPC



CPC

USPC



ECLA



F-Term/
F-Index



SEARCH QUERY

FIELD
CODES

RANGE
SEARCH

BOOLEAN
OPERATOR

SEARCH QUERY: FIELD CODE



Text fields (Title, Abstract, Description, Claims, Sequence data)

Names (Applicants/Assignees, Inventors, Country)

Numbers (priority number, application number, publication number, **family members**, citations)

Classification codes (e.g. International Patent Classification/**Cooperative Patent Classification**)

Dates (priority, application and publication dates)

Images (Diagrams)

Additional Information (Legal Status, Public Registry etc)

SEARCH QUERY: BOOLEAN OPERATOR



GRAPHENE

28340 families/44108 patents

BATTERY

701571 families/1029859 patents

AND

Ta: (**graphene AND battery**)

2219 families/3292 patents

OR

Ta: (**graphene OR battery**)

727690 families/1070675 patents

NOT

Ta: (**graphene NOT battery**)

26239 families/40816 patents


NOT

Ta: (**battery NOT graphene**)

699432 families/1026567 patents

11/26/2017


SEARCH QUERY: RANGE AND PROXIMITY



<p>ta:"graphene battery"~5 graphene XXXXX battery</p> <p>585 families/790 patents</p>	<p>ta:"graphene battery"~4 graphene XXXX battery</p> <p>474 families/647 patents</p>
~/NEAR	
<p>ta:"graphene battery"~3 graphene XXX battery</p> <p>345 families/483 patents</p>	<p>ta:"graphene battery"~2 graphene XX battery</p> <p>238 families/337 patents</p>

11/26/2017


SEARCH QUERY: RANGE AND PROXIMITY



<p>ta:(graphene AND battery)</p> <p>No time limit</p> <p>2219 families/3292 patents</p>	<p>ta:(graphene AND battery)</p> <p>2007-2017</p> <p>2217 families/3268 patents</p>
Publication Date	
<p>ta:(graphene AND battery)</p> <p>2010-2017</p> <p>2203 families/3241 patents</p>	<p>ta:(graphene AND battery)</p> <p>2014-2017</p> <p>1869 families/2608 patents</p>

11/26/2017

PATENT CLASSIFICATION







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IPC International Patent Classification


USPC United States Patent Classification
460 subclasses/150,000 subdivisions

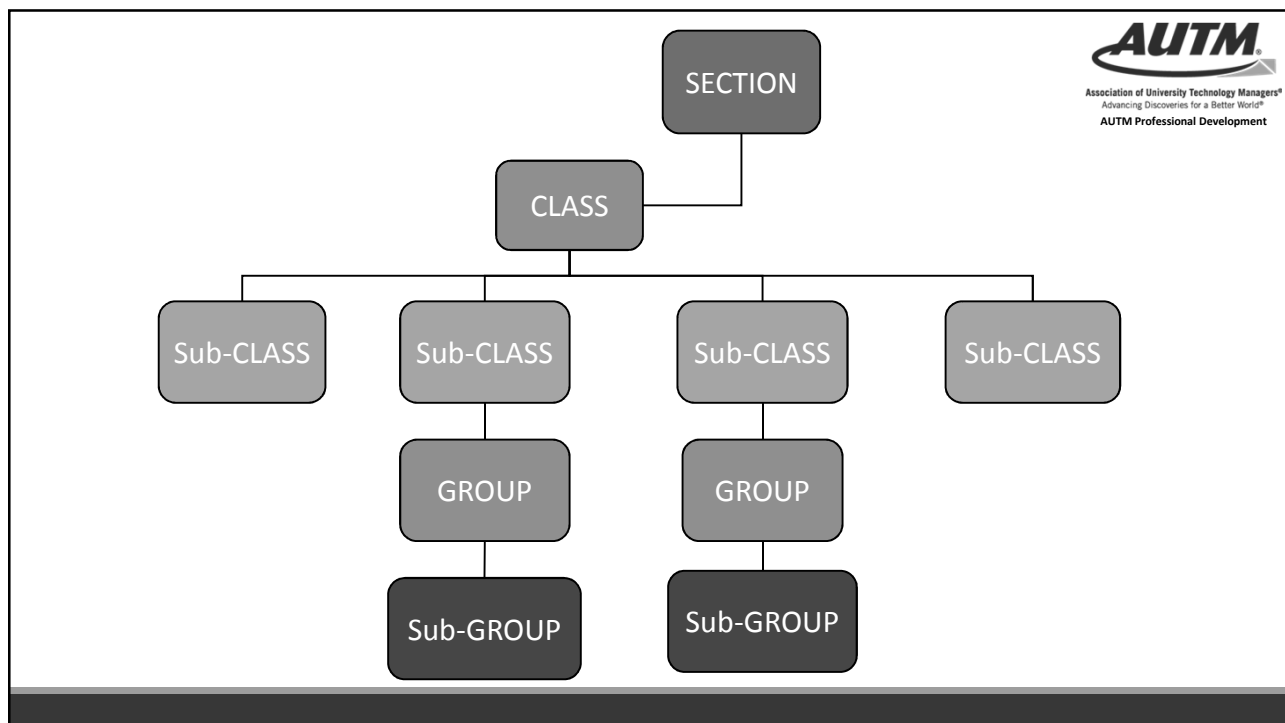
ECLA European Classification

**F-Term/
F-Index** Japanese Classification Systems

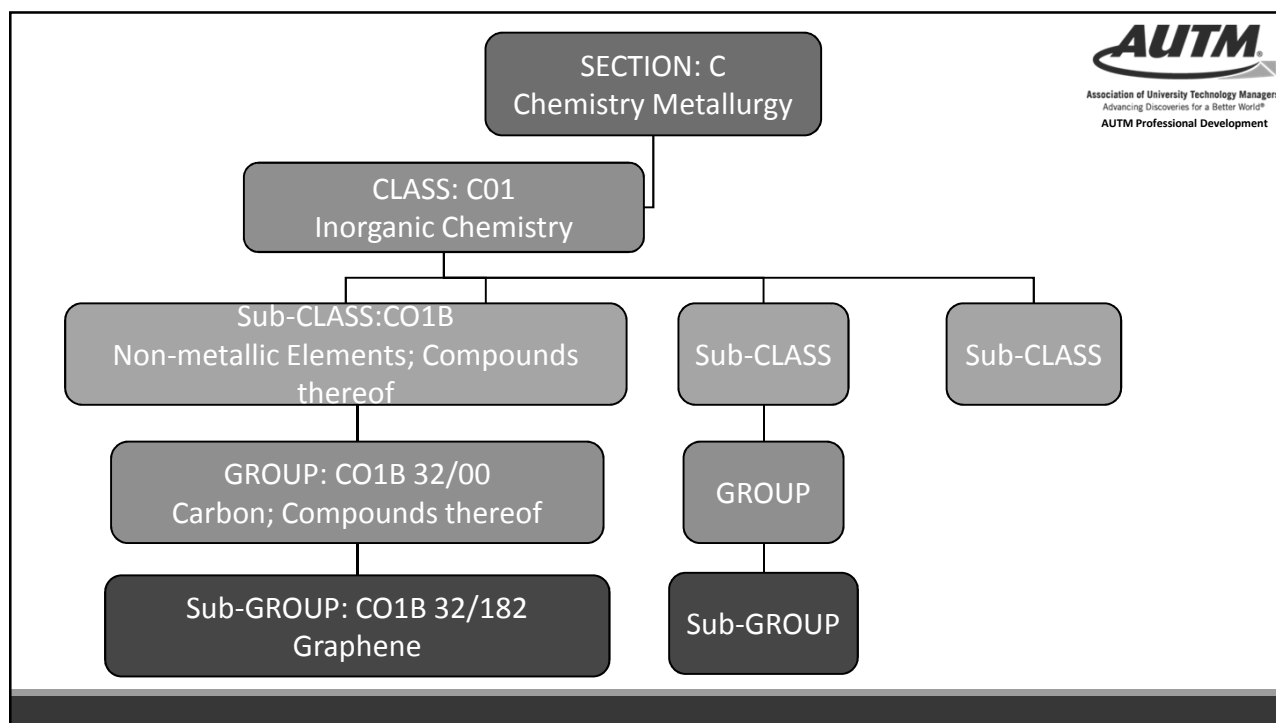





CPC
Cooperative
Patent
Classification
*653 subclasses/
250,000 subdivisions*





Symbol	Classification and Description (CPC)
A	HUMAN NECESSITIES
B	PERFORMING OPERATIONS; TRANSPORTING
C	CHEMISTRY; METALLURGY
D	TEXTILES; PAPER
E	FIXED CONSTRUCTIONS
F	MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING
G	PHYSICS
H	ELECTRICITY
Y	GENERAL TAGGING OF NEW TECHNOLOGICAL DEVELOPMENTS; GENERAL TAGGING OF CROSS-SECTIONAL TECHNOLOGIES SPANNING OVER SEVERAL SECTIONS OF THE IPC; TECHNICAL SUBJECTS COVERED BY FORMER USPC CROSS-REFERENCE ART COLLECTIONS [XRACs] AND DIGESTS



Where to find CPC code?



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Cooperative Patent Classification website

<https://www.cooperativepatentclassification.org//index.html>



Using keywords to find relevant classification

https://worldwide.espacenet.com/classification?locale=en_EP

<https://www.uspto.gov/>

THE QUESTIONS



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THE TREND: HOW IMPORTANT IS MY SUBJECT?



Field	What information can be retrieved
Priority Date	Number of patents per year for a company or a technological sector Evolution of patent policy



THE APPLICANTS: IS MY SUBJECT OPEN? WHO ARE THE LEADERS?



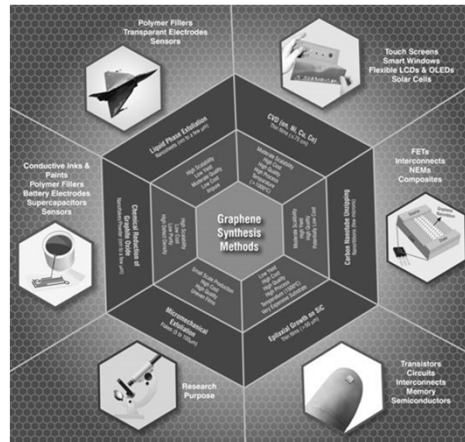
Field	What information can be retrieved?
Applicants	<p>High number at low frequency → a subject relatively open</p> <p>Leader, followers in technological sectors → Potential Licensee</p>



THE APPLICATIONS: IS MY SUBJECT SCATTERED IN DIFFERENT DOMAINS?



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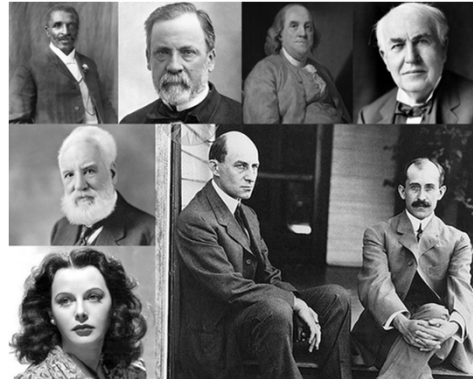


Field	What information can be retrieved
CPC CODE	<p>Main and secondary technologies</p> <p>Diversity of technology</p> <p>Macro or micro vision depending on the truncation of the code (e.g. CPC 4: Macro vision)</p>



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THE INVENTORS: WHO ARE THE EXPERTS?



Field	What information can be retrieved
Inventors	Main researchers/experts

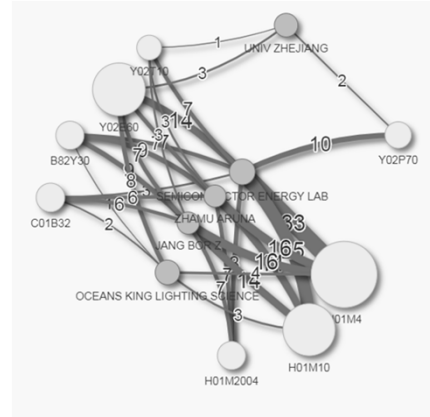


MULTIPLE FIELDS ANALYSIS



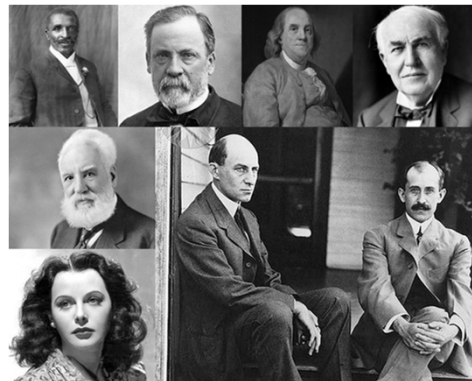
	B82Y30	C01B32	H01M4	H01M10	H01M2004	Y02E60	Y02P70	Y02T10	Total
HARBIN INST OF TECHNOLOGY						2.00		2.00	4.00
JANG BOR Z LG CHEMICAL LTD	9.00	6.00	16.00	14.00	7.00	7.00		3.00	62.00
OCEANS KING LIGHTING SCIENCE SEMICONDUCTOR ENERGY LAB		1.00	6.00	6.00	1.00	4.00	1.00	3.00	22.00
UNIV CENTRAL SOUTH	1.00	2.00	4.00	3.00		8.00			18.00
UNIV FUDAN	7.00	3.00	33.00	25.00	8.00	14.00	10.00	7.00	107.00
UNIV SHANGHAI ZHEJIANG		1.00	1.00						2.00
ZHAMU ARUNA						5.00			5.00
						2.00			2.00
						3.00	2.00	1.00	6.00
Grand total	26.00	19.00	76.00	62.00	23.00	52.00	13.00	19.00	290.00

MATRIX



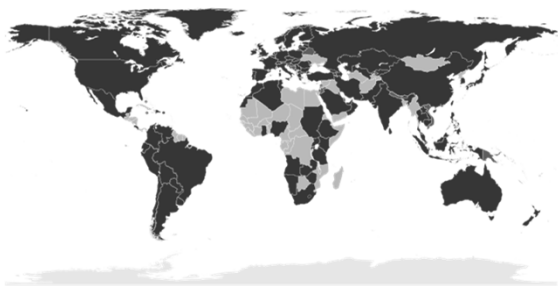
NETWORK

PRIORITY YEAR/INVENTORS: WHAT IS THE INVENTORS ACTIVITIES EVOLUTION?



Field	Inventors
Priority Years	<p>If an inventor starts/stops working → Change of strategy of a company/university to exit/enter the sector</p> <p>Change of function or domain of interest for the inventor</p>

**PRIORITY COUNTRY/PRIORITY YEAR:
 WHAT IS THE EVOLUTION OF THE ACTIVITY
 PER COUNTRY?**



Field	Priority Years
Priority Countries	<p>If a country has started early and is still working → Politics to encourage its companies to be leader (subsidize?)</p> <p>If a country has started recently, he is a newcomer → New invention or improvement?</p>




CPC/INVENTORS: WHERE CAN I FIND AN EXPERT?

The diagram illustrates various graphene synthesis methods and their applications. At the center is 'Graphene Synthesis Methods'. Surrounding it are:

- Polymer Fillers:** Transparent Electrodes, Sensors
- Touch Screens:** Smart Windows, Flexible LCDs & OLEDs, Solar Cells
- FETs:** Interconnects, MEMs, Composites
- Transistors:** Circuits, Memory, Semiconductors
- Conductive Inks & Films:** Polymer Filters, Battery Electrodes, Supercapacitors, Sensors
- Research Purpose:** (with an image of a microscope)
- Other methods:** Liquid Phase Exfoliation, CVD (on Si, SiO₂), Hummer's Method, Epitaxial Growth, Oxidation of Graphite, Mechanical Exfoliation, Chemical Vapor Deposition, and Epitaxial Growth.

A collage of black and white portraits of various scientists and inventors, including figures like Edison, Tesla, and others.

Field	INVENTORS
CPC	<p>→ Find an expert in specific fields</p> <p>→ Is (s)he still working on the subject? </p> <p>→ Check LinkedIn or Google his/her name</p>



CPC/PUBLICATION YEAR: WHAT IS THE EVOLUTION OF TECHNOLOGIES?



Field	PUBLICATION YEAR
CPC	<p>Highlight technologies emerging, declining and relative evolution of core technologies</p> <p>Single company patent portfolio → Complete mapping of the company's technological policy</p>



CPC/PRIORITY COUNTRY: WHAT IS THE ACTIVITY FIELD PER COUNTRY?

Graphene Synthesis Methods

- Polymer Fillers**: Transparent Electrodes, Sensors
- Conductive Inks & Films**: Polymer Fillers, Battery Electrodes, Supercapacitors, Sensors
- Thin Films**: Li-ion Batteries, Supercapacitors, Sensors
- Graphene Synthesis Methods**: Mechanical Exfoliation, Chemical Exfoliation, Epitaxial Growth, CVD (Roll-to-Roll, Batch)
- Carbon Nanotubes**: Composites
- FETs**: Interconnects, MEMS, Composites
- Resistive Crosslinks**: Interconnects, Memory, Semiconductors
- Li-ion Batteries**: Anodes, Cathodes, Electrolytes
- Research Purpose**




Field	PRIORITY COUNTRY
CPC	<p>Highlight the R&D trend(s) for each country</p> <p>Highlight which country own core or specific technology</p> <p>Highlight which country develop applications</p>


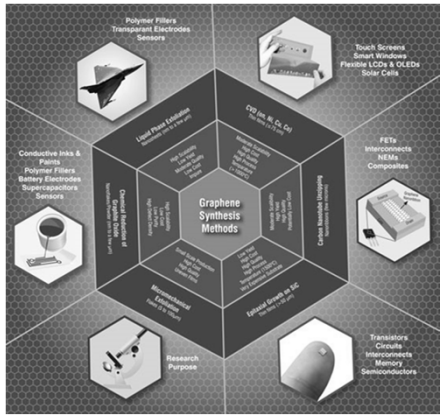



CPC/CPC: HOW DIFFERENT TECHNOLOGIES ARE LINKED?



Field	<p>CPC</p> 
CPC	<p>Show which technologies are interconnected</p> <p>Show which clusters of technologies are isolated</p> <p>Show the weak signals</p>

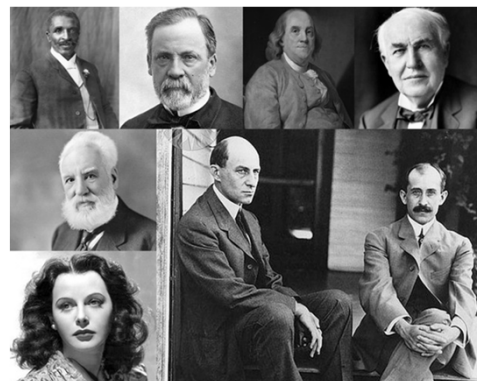
APPLICANT/CPC CODE: WHAT IS THE FIRMS' ACTIVITY FIELDS?

Field	CPC Code
Applicants	<p>Applicants with same CPC are direct competitors</p> <p>Show if the R&D of applicants is spread or focus on a specific domain</p> <p>Show if university is in phase with the market</p>



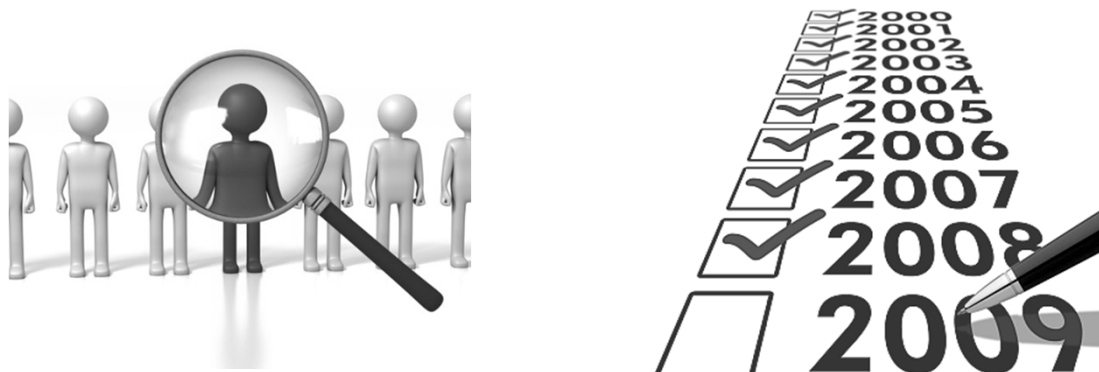
APPLICANT/INVENTORS: IS THERE A POSSIBLE THRESHOLD OF INVESTMENT IN R&D?



Field	Inventors
Applicants	<p>The number of inventors and frequencies per firm → This indicates a possible threshold of R&D investment</p>

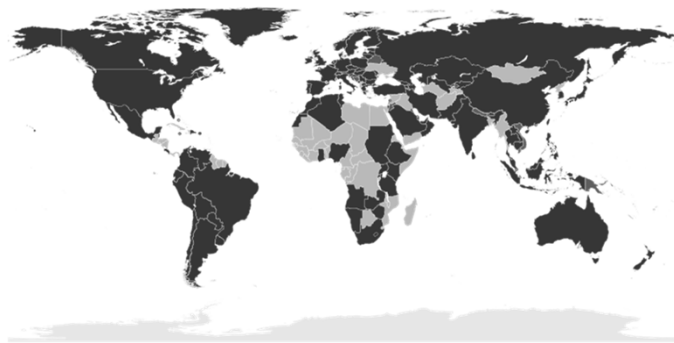
APPLICANT/PRIORITY YEAR:

WHAT IS THE EVOLUTION OF FIRMS' ACTIVITIES?



Field	Priority Year
Applicants	<p>Show company still working on the subject</p> <p>Highlight companies who enter or exit the market</p> <p>If a company has exit the market, she still may own valuable IP</p>

APPLICANT/PRIORITY COUNTRY: WHAT IS THE FIRMS' MARKET STRATEGY?



Selection of University patents

Build the filter `apwin:univ` and apply
 Results: 200 families for 231 patents
 Note the repartition by countries using the CC

Country Code	
Country	
CN	<input type="checkbox"/>
WO	<input type="checkbox"/>
KR	<input type="checkbox"/>
US	<input type="checkbox"/>
JP	<input type="checkbox"/>



If you want to go further and make a hierarchy among patents, consider the WO Patents for instance
 Build the filter `apwin:univ AND pn:wo*` (* wide truncation)

WO2015156446A1 - Graphene-metal Nanoparticle Composite, Carbon Nanofiber Composite Containing ...

GLOBAL DATA CLAIMS DESCRIPTION COMPARE FAMILY LEGAL CITATION DRAWING FULL DOCUMENT

English Title: **graphene**-metal Nanoparticle Composite, Carbon Nanofiber Composite Containing Composite, And Secondary **battery** Containing Carbon Nanoparticle Composite

Titre Français: Composite De Nanoparticule De Graphène Et De Métal, Composite Contenant Un Composite De Nanofibre De Carbone, Et Batterie Secondaire Contenant Un Composite De Nanoparticule De Carbone

Patent Number: WO2015156446A1

Score: 80%

Legal Status: **Lapsed**

Publication Date: 2015-10-15

Applicant(s): univ Nat Chonnam Ind Found

Inventor(s): Yang Kap Seung, Kim Bo Hye, Kim So Yeun

Go to Google Scholar or to the university Internet site

A word about Chine patents

Example – Graphene and Battery in titles limit from 2007 to date (14-11-2017)
Result: 555 families for 755 patents

Build the filter `prcn:CN*` and apply
Result 483 Families for 570 patents

Compared to the global result 555 families for 755 patents shows that the number of Chinese patents is overwhelming

Rule of the thumb:

Make the distinction with utility models and patents (less relevant)

Build the filter `prcn:CN* AND ab:utility AND ab:model` and apply
 All utility models have an abstract beginning with: This utility model
 Result 15 families for 15 patents

Make a distinction with extended patent (most of the time WO) (more relevant)

Build the filter `prcn:CN* AND pn:wo*`
 Results: 14 patents

WO2016154887A1 - Zinc Ion Battery Adopting Graphene Oxide As Positive Electrode

GLOBAL DATA CLAIMS DESCRIPTION COMPARE FAMILY LEGAL CITATION DRAWING FULL DO

English Title: Zinc Ion **battery** Adopting **graphene** Oxide As Positive Electrode

Titre Français: Batterie À Ions Zinc Comportant Un Oxyde De Graphène En Tant Qu'Électrode Positive

Patent Number: WO2016154887A1

Score: 83%

Legal Status: **Pending**

Publication Date: 2016-10-06

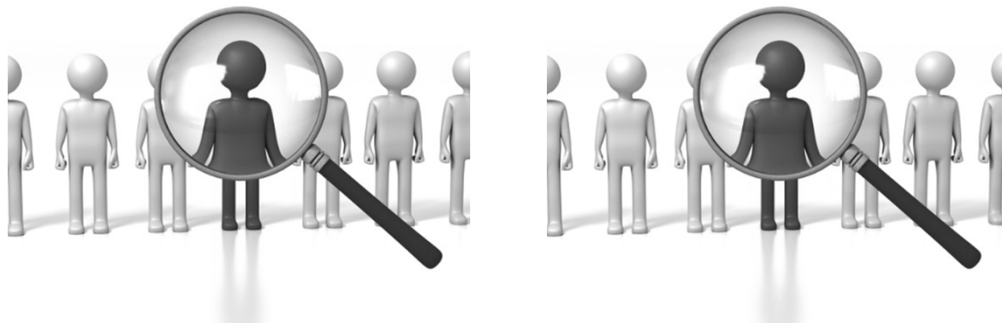
Applicant(s): Shenzhen Cubic-science Co Ltd

Inventor(s): Wei Chunguang



Field	Priority Country
Applicants	<p>Delivered patents: Show in which country companies want to develop their market</p> <p>WO/PCT: Show which company may/wants to develop their market abroad</p>

APPLICANT/APPLICANT: WHICH FIRMS/UNIVERSITIES COLLABORATE?



Field	Applicants
Applicants	<p>Show the collaboration(s) between firms and/or universities</p> <p>Several patents in common can mean a strong relationship and partnership</p>



Example – Graphene and Battery in titles limit from 2007 to date (11-26-2017)

Result: 576 families for 782 patents

How to find patents containing non-patent literature

- Create a filter npl:* *wide truncation and apply. This will select all the patent with a non-patent literature field.
- **Result: 169 families for 207 patents**

WO2013181994A1 - Graphene Powder, Method For Producing Graphene Powder And Electrode For Lithi...						
GLOBAL DATA	CLAIMS	DESCRIPTION	COMPARE FAMILY	LEGAL	CITATION	FULL DOCUMENT
▼	CN104271497A	2015-01-07	Toray Advanced Materials Res Lab China Co Ltd		Graphene Powder, Method For Producing Graphene Powder And El...	Unknown
▼	CN103466602A	2013-12-25	Toray Advanced Materials Res Lab China Co Ltd		Preparation Method Of Graphene Powder, And Application Of Gr...	Unknown
▼	EH CA2672445A1	2013-12-12	* Toray Industries		Graphene Powder, Method For Producing Graphene Powder And El...	Unknown

Non-Patents Literature

XU, LI QUN ET AL., "Dopamine-induced reduction and functionalization of graphene oxide nanosheets", MACROMOLECULES, vol. 43, no. 20, 27 September 2010 (2010-09-27), pages 8336 - 8339, XP055173219

See also references of EP 2655945A1

RUOFF ET AL., CARBON, vol. 45, 2007, pages 1558

LI ET AL., NATURE NANOTECHNOLOGY, vol. 3, 2008, pages 101

LIU ET AL., J. PHYS. CHEM. C, vol. 116, 2012, pages 3334 - 3341

KAMINSKA ET AL., APPL. MATER. INTERFACE, vol. 4, 2012, pages 1016

LIU ET AL., MACROMOLECULES, vol. 43, 2010, pages 8336

From the non – patent literature move to Google Scholar

Dopamine-Induced Reduction and Functionalization of Graphene Oxide Nanosheets

Li Qun Xu[†], Wen Jing Yang[†], Koon-Gee Neoh[†], En-Tang Kang^{†*}, and Guo Dong Fu^{*†}

[†] Department of Chemical & Biomolecular Engineering, National University of Singapore, Kent Ridge, Singapore 119260

[†] School of Chemistry and Chemical Engineering, Southeast University, Jiangning District, Nanjing, Jiangsu Province, P. R. China 211189



	Inventor	Priority Year	Priority Country	CPC Code	Patent Assignee	...
Inventor	Inventors Network					
Priority Year	Inventors' activities evolution					
Priority Country	Inventors' country of origin	Evolution of the activity per country				
CPC Code	Experts per domain	Evolution of technology trends	Activity fields per country	Links between technologies		
Patent assignee	Link inventor – patent assignee	Evolution of firms' activities	Filing countries for firms (market)	Activity fields of companies	Collaboration between firms	
Patent family		Evolution of the interests for national markets	Filing strategies at national levels	Activity fields exploited per country	Filing strategies	
Patent family size		Evolution of patent extensions	Filing strategies at national levels		Filing strategies	



European IPR Helpdesk
 Fact sheet
 Automatic Patent Analysis
 December 2013

THANK YOU

