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Patents, A Source Of Information Often Overlooked By Academics

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Abstract—Patents are an essential source of scientific and technical information. Yet it is only rarely used by academics, although access to patent databases is free. Patents thus constitute a source of information which, by testing ideas or highlighting the applications of academic research, paves the way for innovation. We briefly present here the main characteristics useful for the use of patents in the academic field.

Keywords: *patent, innovation, information source, automatic analysis, idea testing*

Résumé

Les brevets constituent une source d'information scientifique et technique incontournable. Pourtant celle-ci n'est que rarement utilisée par les universitaires, bien que l'accès aux bases de données brevets soit gratuit. Les brevets constituent ainsi une source d'information qui permet en testant ses idées ou en mettant en évidence les applications des recherches académiques d'ouvrir la voie à l'innovation. On présente ici brièvement les principales caractéristiques utiles pour l'utilisation des brevets dans le champ académique.

Mots clés : *brevet, innovation, information source, analyse automatique, test des idées*

1 - INTRODUCTION

Patents are often considered from a legal point of view, as a tool for protecting product, ideas, etc. However, they constitute a unique base of scientific and technical, even economic information, and this aspect is almost never used in publications of a scientific nature [1]. Indeed, if we examine the bibliography of published articles, we only very rarely find a patent citation. However, the number of patents filed is growing, for example 3.27 million for the year 2020¹. Patent information allows to:

test an idea, which avoids re-inventing the wheel
catalyze integration into an innovation process
place academic research in an economic context
direct the knowledge acquired in a research laboratory towards possible applications
situate research in an ascending or declining movement
seek potential partners, academic or industrial
find solutions to simple problems of chemical synthesis for example.

Indeed, the structure of a patent leads to knowing: the applicants (or holders of the patent generally companies or universities), the inventors, the filing date, the description of the invention or the process, the claims of protection. In addition, there is in some patents a field on "non-patent literature" where citations of scientific works (publications, proceedings,..) are cited by the patent applicant as being the basis of the claimed invention.

A Example

Data processing system disposed on sensor and method thereof and de-identified device

Ind Tech Res Inst

 TW109108286A 20200313 (TW = Taiwan)

Non-Patent Literature

• K. Tang et al., "Considerations of Integrating Computing-In-Memory and Processing-In-Sensor Into Convolutional Neural Network Accelerators For Low-Power Edge Devices," 2019 Symposium on VLSI Circuits, Kyoto, Japan, 29 July 2019, pp. T166-T167

Like scientific literature, some patents may cite other patents. A distinction is then made between the cited patents (when they are cited by other patents) and

[patent-applications-worldwide/#:~:text=As%20of%202020%2C%20the%20number,reached%20around%203.22%20million%20applications.](#)

¹ Patents applications year 2020

<https://www.statista.com/statistics/257610/number-of->

the patent citations introduced by the writer of the patent. This allows to introduce a bibliographic extension with a high hierarchy value.

B Example :



Patent WO2020190943A1 cites patent EP3370353A1 which also cites another patent. On the other hand, the same patent is cited by patent US11216251B2. So its value increases.

Distributive Photonic Monobit Analog-to-digital Converter

Application	Publication
US2020023151	WO2020190943A1

Sideband Photonic Radio Frequency (Rf) Noise Generator

Application	Publication
US201916359248	US11216251B2

2 – THE MAIN PATENT DATABASES

Most of industrialized countries have a national intellectual property office, and a related database of national patents to be consulted in the language of the country. But there is also a very interesting database for researchers: the worldwide database (Espacenet)² of the EPO (European Patent Office) which is searchable in English on the titles and the summary of the patents, as well as on the applicant field, inventors, dates, this database contains more than 120 million notices! You can also consult the databases of European patents, Patent Scope³ (for world patents), Asean Patent Scope⁴, US patents (via the two national databases or via Google Scholar⁵) they can be consulted in English and in full text, if necessary. Moreover, and this is important, their access is free!

A The case of Chinese patents

China currently produces more than half of the patents in the world. But, Chinese patents are only rarely extended in other countries (for example via

world patents). If we want to avoid an excessive presence of Chinese patents in the results (mainly at the level of statistical analyses), we can use the patent database dealing only with world patents. Statistically, Chinese patents can be treated separately with a distinction between patents and utility models (utility certificate) [2].

3 – THE INTERNATIONAL PATENT CLASSIFICATION A USEFUL TOOL FOR RESEARCHERS

Patents are not indexed with keywords. But they are indexed via the International Patent Classification⁶ (IPC) which classifies inventions in different fields, which makes it possible by combination with other descriptors (applicants, inventors, dates, words from titles or titles plus abstracts ..) to facilitate searches and on the other hand to carry out powerful statistical analyses. This classification is based on the combination of 8 digits (numbers plus letters). For example A61K* deals with what is medical, dental and hygiene. The asterisk is a truncation to select all codes starting with A61K. The heading letters go from A to H to cover most of the application domains, such as Physics, Electricity, Agriculture, etc.

A Example :

² Espacenet

<https://worldwide.espacenet.com/patent/search>
https://www.epo.org/searching-for-patents/technical/espacenet_fr.html

³ Patent Scope

<https://patentscope.wipo.int/search/fr/search.jsf>

⁴ Asean Patent Scope

<http://ipsearch.aseanip.org/wopublish-search/public/patents?3=>

⁵ Google Scholar <https://scholar.google.com/>

⁶ IPC <https://worldwide.espacenet.com/patent/cpc-browser#!/CPC=A61K>

<input type="checkbox"/> A61	MEDICAL OR VETERINARY SCIENCE; HYGIENE
<input type="checkbox"/> A61K	PREPARATIONS FOR MEDICAL, DENTAL, OR TOILET PURPOSES (devices or methods specially adapted for bringing pharmaceutical products into particular physical or administering forms A61J 3/00 ; chemical aspects of, or use of materials for deodorisation of air, for disinfection or sterilisation, or for bandages, dressings, absorbent pads or surgical articles A61L ; soap compositions C11D)
<input type="checkbox"/> A61K 6/00	Preparations for dentistry
<input type="checkbox"/> A61K 8/00	Cosmetics or similar toilet preparations
<input type="checkbox"/> A61K 9/00	Medicinal preparations characterised by special physical form ((nuclear magnetic resonance contrast preparations or magnetic resonance imaging contrast preparations A61K 49/18 ; preparations containing radioactive substances A61K 51/12))
<input type="checkbox"/> A61K 31/00	Medicinal preparations containing organic active ingredients
<input type="checkbox"/> A61K 33/00	Medicinal preparations containing inorganic active ingredients
<input type="checkbox"/> A61K 35/00	Medicinal preparations containing materials or reaction products thereof with undetermined constitution
<input type="checkbox"/> A61K 36/00	Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. traditional herbal medicines ((antigens from pollen A61K 39/36))
<input type="checkbox"/> A61K 38/00	Medicinal preparations containing peptides (peptides containing beta-lactam rings A61K 31/00 ; cyclic dipeptides not having in their molecule any other peptide link than those which form their ring, e.g. piperazine-2,5-diones, A61K 31/00 ; ergot alkaloids of the cyclic peptide type A61K 31/48 ; containing macromolecular compounds having statistically distributed amino acid units A61K 31/74 ; medicinal preparations containing antigens or antibodies A61K 39/00 ; medicinal preparations characterised by the non-active ingredients, e.g. peptides as drug carriers, A61K 47/00)
<input type="checkbox"/> A61K 39/00	Medicinal preparations containing antigens or antibodies (materials for immunoassay G01N 33/53)

4 – AUTOMATIC ANALYSIS OF A GROUP OF PATENTS

Given the large number of patent notices currently available, a search often leads to an important number of patent notices. The use of automatic analysis then leads to better understand the trends, actors and sub-domains of these sets of responses. Platforms such as Patent Pulse⁷ allows this processing to be carried out on various bases (Espacenet, US, European, Canadian, Spanish, world patent databases).

5 – A FEW EXAMPLES

A What are the uses of 4-Methyl Thiazole in Medical Field

Most of researchers will look for the answer in scientific publications, which is not obvious, but a query of the Espacenet database leads to 26 answers. The search was carried out on the term "4-methyl thiazole" associated with the international classification A61K* which deals with preparations for medical, dental, or toilet purposes. We can note among the results:

Composition fragrance

Shiseido Co Ltd, Takasago Perfumery Co Ltd
Patent number JP2011132359A

PROBLEM TO BE SOLVED: To provide a fragrance composition that people feel excellently natural, fresh and mellow like a rose, which has been difficult to reproduce even with combinations of various kinds of ingredients usually known as rose perfumes.

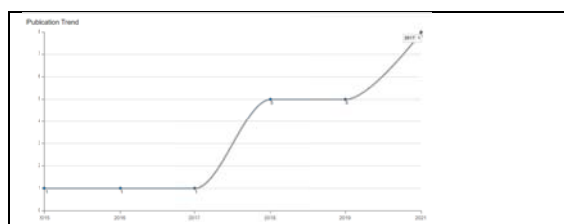
SOLUTION: The rosy fragrance composition comprises being supplied with methyl epi-jasmonate alone or in combination with 2-isopropyl-4-methyl thiazole; the method for producing the rosy fragrance composition; and the method for providing a

fragrance composition with a perfume, which comprises providing the base fragrance composition having primarily a rosy perfume with methyl epi-jasmonate alone or in combination with 2-isopropyl-4-methyl thiazole. The method allows to provide a fragrance composition that feels excellently natural, fresh and mellow like a rose.

B Evolution of technological research in the capture of CO2 from the combustion of coal and analysis of the results⁸.

We use the World patent database (patents extended to several countries), we query the database with the terms: capture and coal and (CO2 OR "carbon dioxide") since 2010, on the title of the patents.

We get the following result: 42 patents. This number is low and indicates that we are in a very specialized field, which does not mean that it is not current.



The field is growing rapidly. The figures indicated are families of patents (patents extended to various countries and covering the same invention). The subject is therefore, because of the current economic situation, promising.

⁸ Analysis from the platform Patent Pulse www.patent-pulse.com

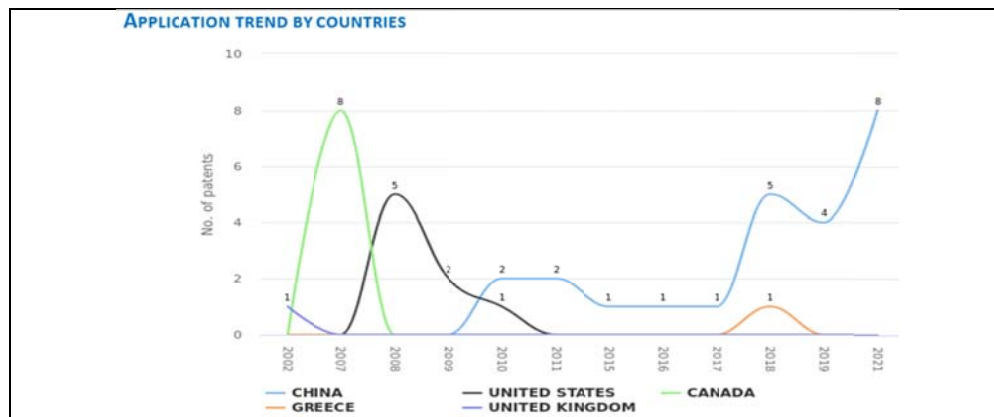
⁷ Patent Pulse www.patent-pulse.com

The main actors are:

Companies	CA	CN	GB	US	WO
Air Liquide	1				
Canada Natural Resources					1
Design Inst Co Ltd	1				
China Resources Power Haifeng Co Ltd	1				
Gasconsult Ltd			1		
Guandong Southern Carbon Capture and Storage Center	1				
Guanxi Guisheng New Energy Science and Technology Co Ltd	1				
Huaneng Clean Energy Res Inst	2				
Jiangsu Fang Tian Power Tech co	3				
Lu An Mining Industry Group Co Ltd	1				
Savannah River Nuclear Solutions Llc				1	
Univ China Petroleum	1				
Univ North China Elec Power	1				
Univ Southeast	4				

The automatic creation of a complete report (in word) will conduct to deepen the relations between fields of

application, applicants, dates, inventors, countries, etc. An excerpt is shown below.



6 – CONCLUSION

The use of patents in addition to academic scientific information allows to situate knowledge or research in the world of applications and economy [3]. It also helps to promote links between research and industry [4] [5] as well as the search for potential partnerships. Knowing the ideas and products protected by third parties also avoids embarking on sterile research, but it is also the starting point for potential innovations [6].

For technical and engineering schools, it should be an essential source of information [7]. On the other hand, if a certain number of databases are searchable in English, it is good, depending on the research to be carried out, to also consult national databases. The problem of languages is then partly

solved by automatic translators such as Google Translate⁹ for instance.

7 – BIBLIOGRAPHY

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⁹

Google

Translate

<https://translate.google.fr/?hl=fr&tab=rT>

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