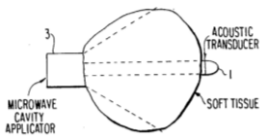
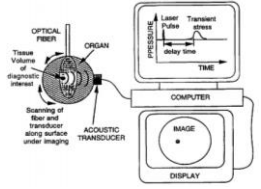


**REPORT
SAMPLE**

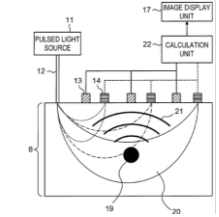
Biomedical Photoacoustic Imaging Patent Landscape



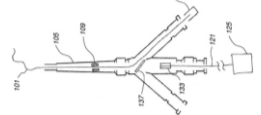
University of Arizona



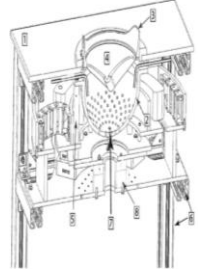
University of Texas



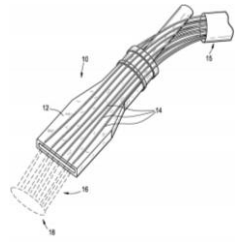
Canon



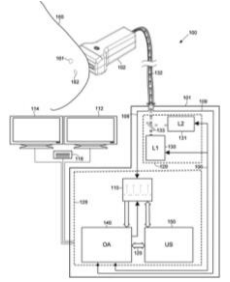
Volcano



ENDRA Life Sciences



VisualSonics



Seno Medical Instruments



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Email: contact@knowmade.fr
Web: www.knowmade.com

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Authors

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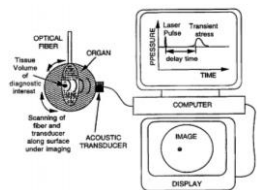
Scope of the Report

**REPORT
SAMPLE**

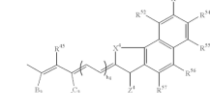
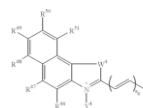
This report provides a detailed picture of the patent landscape for photoacoustic imaging in the biomedical domain. Only patents related to photo- or thermo-acoustic imaging were considered. This report does not include patents related to spectroscopy, blood-sugar detection or other medical imaging technique. This report covers patents published worldwide up to January 2015. More than 900 patent families relevant to the scope of this report have been selected.

**Included
in the study**

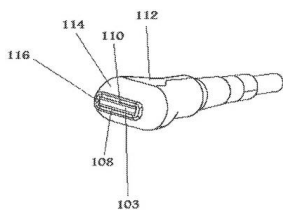
**Not included
in the study**



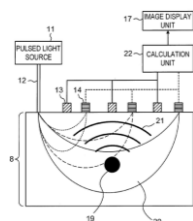
University of Texas
Photoacoustic systems



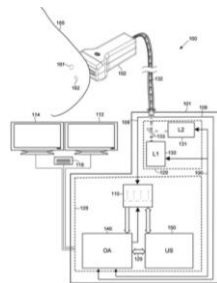
Mallinckrodt
Contrast agents, dyes



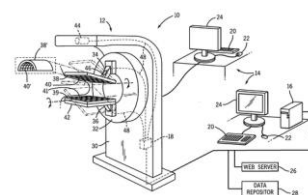
Fujifilm VisualSonics
Probes, catheters, endoscopes,...



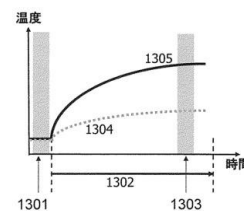
Canon
Photoacoustic devices



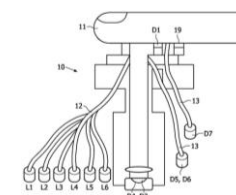
Seno Medical Instruments
Photoacoustic devices



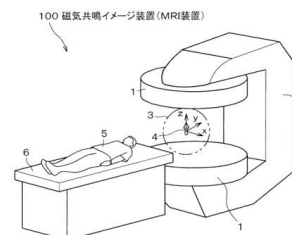
General Electric
Ultrasound and X-rays



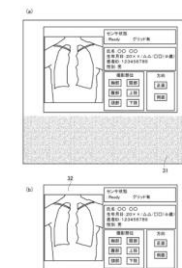
Panasonic
Spectroscopy,...



Philips
Blood-sugar detection,
analytes detection,...



Hitachi Medical
MRI



Canon
X-rays

Key Features of the Report (1/2)

REPORT
SAMPLE

- **The report provides essential patent data for photoacoustic imaging.**
- **It identifies more than 15+ major holders of photoacoustic imaging related intellectual property. It provides in-depth IP analysis and industrial key players including:**
 - Time evolution of patent publications and countries of patent filings.
 - Current legal status of patents.
 - Ranking of main patent applicants.
 - Joint developments and IP collaboration network of main patent applicants.
 - Key patents.
 - Granted patents near expiration.
 - Relative strength of main companies IP portfolio.
 - Overview of patent litigations.
 - Matrix applicants/technology issues for more than 15 companies.
- **The “photoacoustic imaging IP” profiles of 15+ major companies is presented, with key patents, technological issues, litigations, licenses, partnerships, and IP strength and strategy.**

Key Features of the Report (2/2)

REPORT
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- The report also provides an extensive Excel database with all patents analyzed in the report.
- This database allows multi-criteria searches:
 - Patent information
 - Patent publication number
 - Hyperlinks to the original documents
 - Priority date
 - Title
 - Abstract
 - Patent Assignees
 - Legal status for each member of the patent family
- **This report does not provide** any insight analyses or counsel regarding legal aspects or the validity of any individual patent: KnowMade is research firm that provide market and technical analysis and opinions. The research, technical analysis and/or work contained herein is not a legal opinion and should not be construed as such.

Objectives of the Report

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Objectives of this patent landscape is to:

- ✓ Understand the IP landscape for biomedical photoacoustic imaging.
- ✓ Identify key patents.
- ✓ Understand trends in biomedical photoacoustic imaging IP.
- ✓ Identify the major IP players in biomedical photoacoustic imaging and the relative strength of their patent portfolio.
- ✓ Identify new IP players in biomedical photoacoustic imaging.
- ✓ Identify IP collaboration networks between key players.

Methodology (1/2)

REPORT
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- The data were extracted from the FamPat worldwide database (Questel-ORBIT) which provides 90+ million patent documents from 95 offices.
- The patents search was performed in January 2015, hence patents published after this date will not be available in this report.
- The patent selection was done manually.

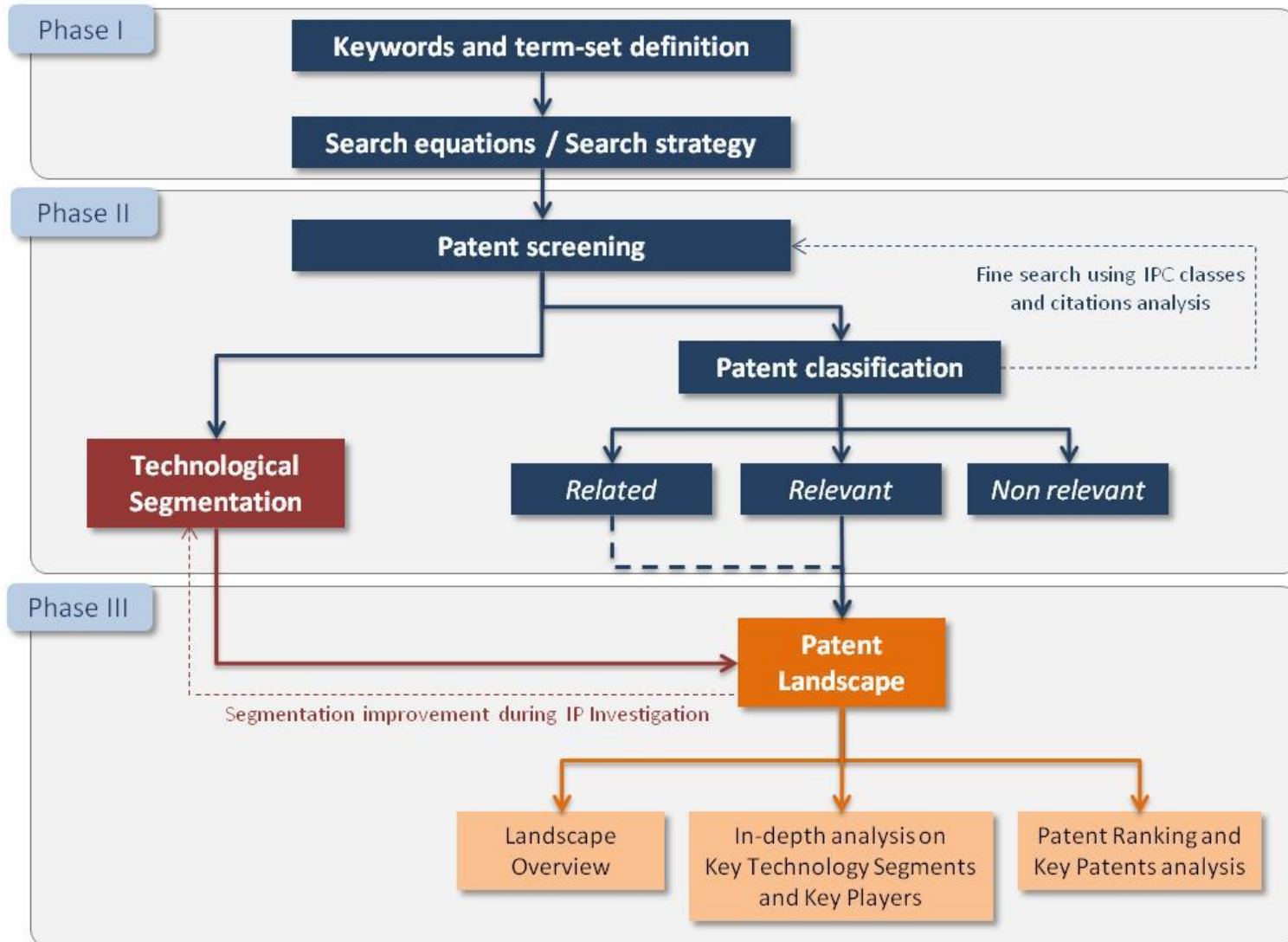
**Number of selected patent families for the photoacoustic imaging IP Investigation:
921 over a number of returned results > 5,000**

- The statistical analysis was performed with Questel Orbit IP Business Intelligence software.
- The patents were manually categorized using keyword analysis of patent title, abstract and claims, in conjunction with expert review of the subject-matter of inventions.
- The patents were organized according to FamPat's family rules (variation of EPO strict family): A *Patent Family* comprises patents linked by exactly same priority numbers (strict family), plus comparison of priority and application numbers, specific rules by country and information gathered from other sources (national files, legal status ...).

Disclaimer: *KnowMade are research firms that provides technical analysis and technical opinions. The research, technical analysis and/or work contained herein is not a legal opinion and should not be construed as such.*

Methodology (2/2)

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Patent Search Strategy

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	STEP	SEARCH EQUATION	RESULT
Patents related to photoacoustic imaging	Step-1	((XXX+ OR XXX+ OR XXX+ OR XXX OR XXX+)/BI/CLMS AND (XXX+ OR XXX+ OR XXX+ OR XXX+ OR XXX+ OR XXX+)/BI/CLMS AND XXX+/IC	> 1,500
Key firms	Step-2	(XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX OR XXX)/PA.FLD	> 570,000
Citing and cited patents	Step-3	CITING AND CITED PATENTS OF SELECTED PATENTS FROM STEP-1 AND STEP-2	> 4,000
Manual selection	Step-4	Selected patent families	921

- + Truncation replacing any number of characters
- ? Truncation replacing zero or one character
- # Truncation replacing one character
- _ Truncation for word that may have a space (ex: semiconductor, semi conductor)
- OR Finds references containing at least one of the words
- AND Finds references containing all words
- S Finds references containing the terms in the same sentence
- nD Finds references containing adjacent terms, regardless of the order, and may be separated by a maximum of n words

- nW Finds references containing adjacent terms, in the order specified, and may be separated by a maximum of n words
- () Parentheses are necessary to combine different operators
- /TI/OTI Search in Title
- /BI Search in Title and Abstract
- /CLMS Search in Claims
- /DESC/ODES Search in Description
- /PA.FLD Search in Patent Assignees
- /IC Search in International Patent Classification (IPC)

Assignees Mentioned in this Report

REPORT
SAMPLE

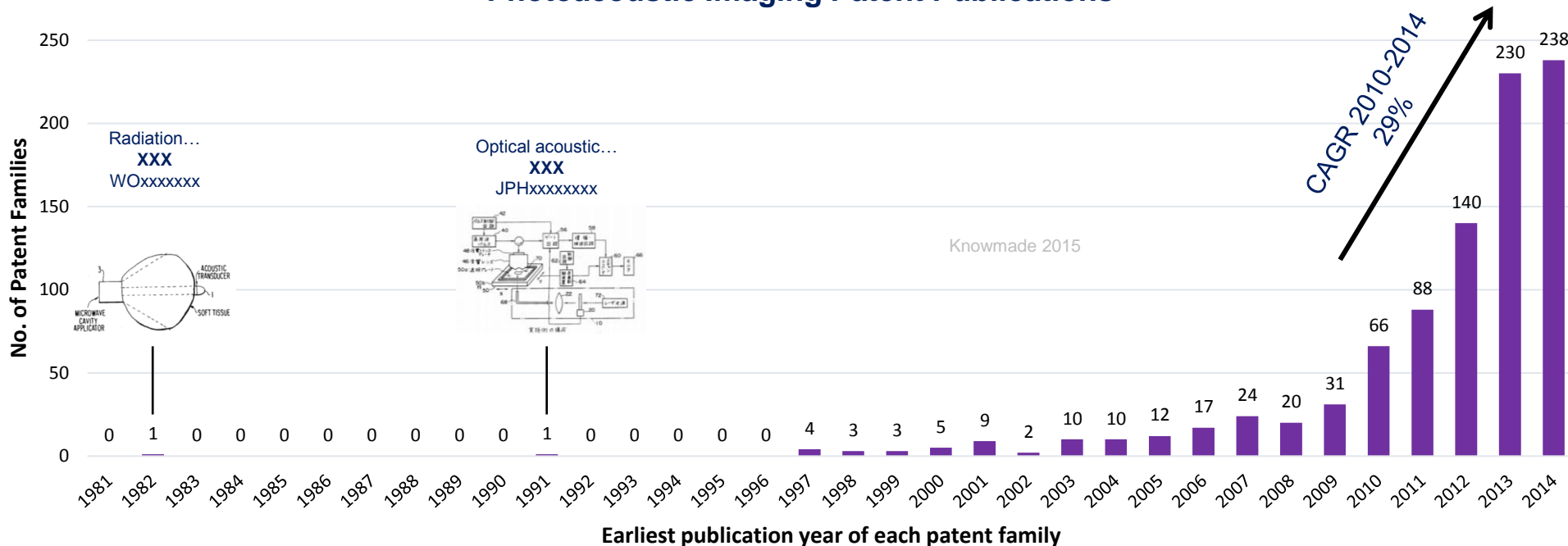
**CANON, FUJIFILM, SONOSITE, VISUALSONICS, SENO MEDICAL INSTRUMENTS, PHILIPS,
VOLCANO, COVIDIEN, MALLINCKRODT PHARMACEUTICALS, SAMSUNG ELECTRONICS,
SAMSUNG MEDISON, INTELLIDX (GLUCON), OPTOSONICS, ENDRA LIFE SCIENCES,
TOMOWAVE LABORATORIES**

**NATIONAL INSTITUTES OF HEALTH, SOUTH CHINA NORMAL UNIVERSITY, UNIVERSITY OF
TEXAS, HELMHOLTZ ZENTRUM MUENCHEN, JIANGXI NORMAL UNIVERSITY SCIENTIFIC
TECHNOLOGY, SHENZHEN INSTITUTE OF ADVANCED TECH. (CAS), LELAND STANFORD
JUNIOR UNIVERSITY, NANJING UNIVERSITY OF TECHNOLOGY, UNIVERSITY OF FLORIDA,
INSTITUTE OF AUTOMATION (CAS), WASHINGTON UNIVERSITY IN ST. LOUIS**

Time Evolution of Patent Publications

**REPORT
SAMPLE**

Photoacoustic Imaging Patent Publications

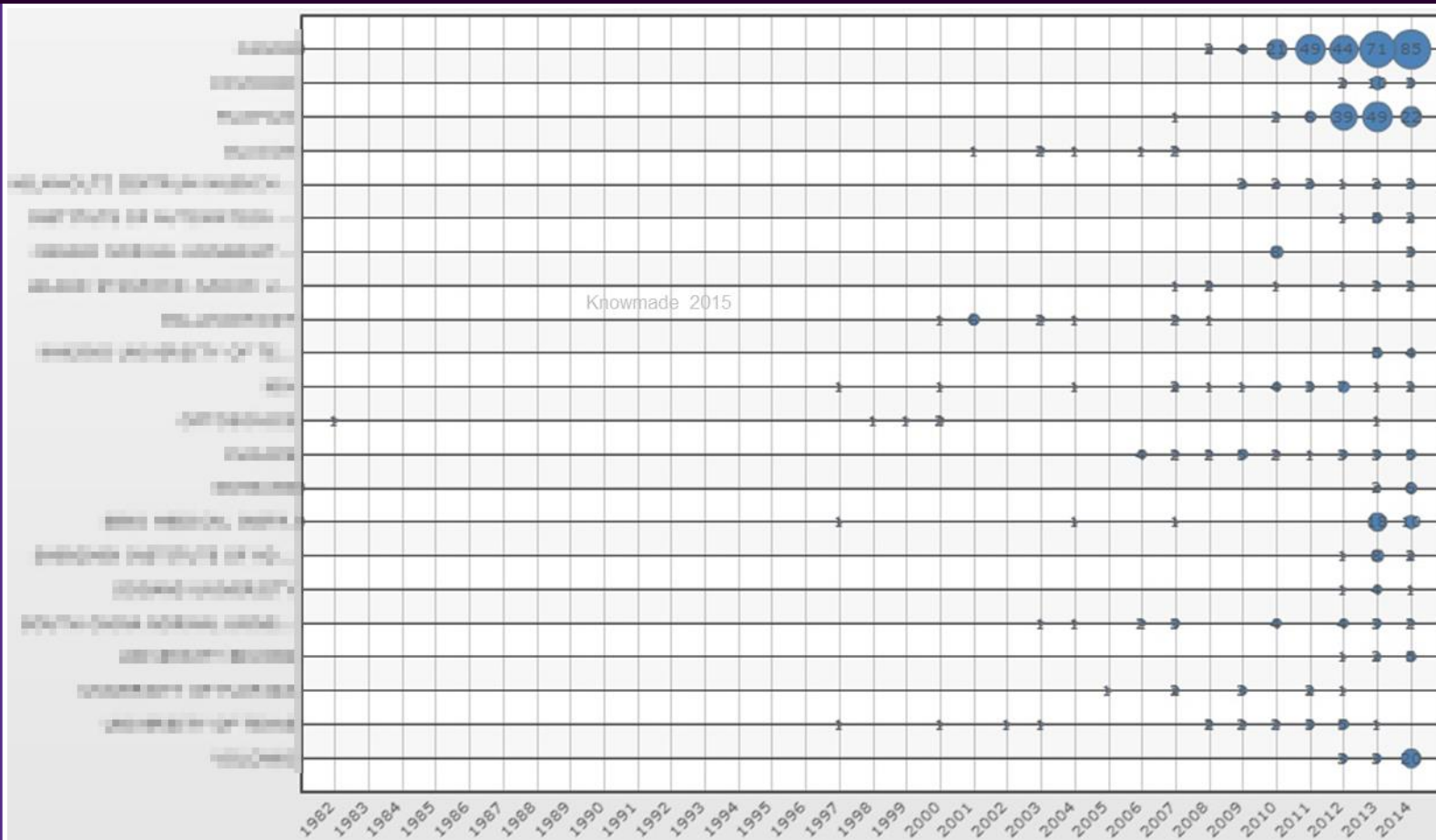


Note: The patent search was done in January 2015, the data corresponding to the year 2015 are not represented here. At the time of the patent search, 7 patent families had been published in January 2015.

In **1982**, the 1st patent disclosing an imaging system using photoacoustic approach was published by **COMPANY XXX** (WOxxxxxxx). The 2nd patent application was published almost 10 years later, in 1991. The number of new patent publications then slowly increased from 1997 to 2009. However, a take off is observed since 2010/2011 : the applications made between 2010 and 2014 represent over 80% of all applications in the domain. This recent take off is partly due to a great increase of the number of new applications made by **COMPANY XXX**, as well as **COMPANY XXX**. By January 2015, **more than 900 patent families** related to biomedical photoacoustic imaging have been published.

Time Evolution of Patent Applicants

**REPORT
SAMPLE**



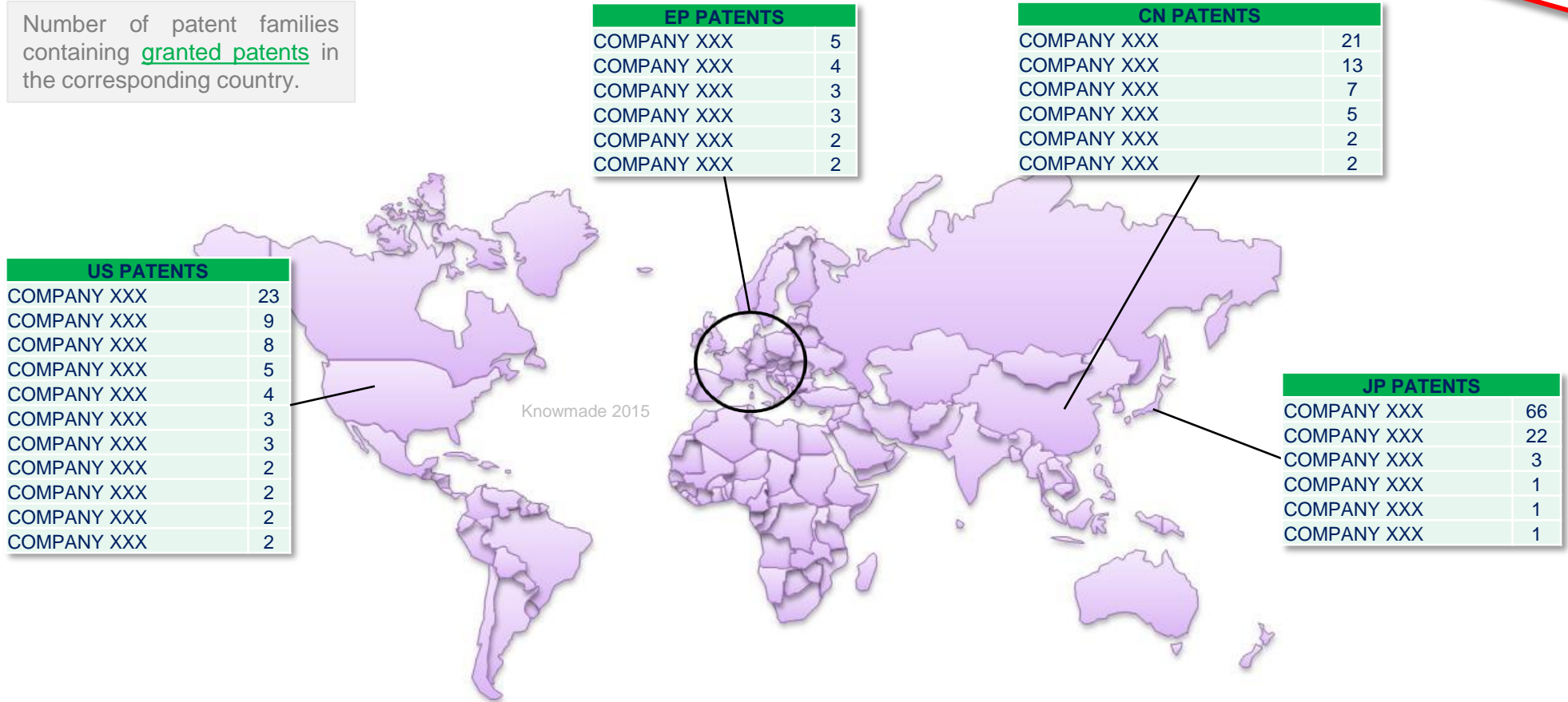
Dates are defined from the earliest publication date for each patent family. Bubble size represents the number of published patent families. The data corresponding to the year 2014 may not be complete since the patent search was done early July 2014.

From 1982 and the publication of the 1st patent in the domain, innovation in the photoacoustic imaging technologies have been slow and only really took off in the late 90s. Both industries and universities filed applications from the beginning. Lately **COMPANY XXX** has significantly increased its patenting activity in the domain. **COMPANY XXX** has also filed more applications in 2012 and 2013. To a lesser extent, American companies **COMPANY XXX** and **COMPANY XXX** have shown an interest in the photoacoustic imaging technology in the last couple of years. Nowadays, if academic applicants are still filling new applications, industrial applicants are getting the upper hand and this should increase with the commercialization of new devices.

Mapping of Main Current IP Holders

REPORT
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Number of patent families containing granted patents in the corresponding country.



The company **XXX** is the main current IP holder in the USA, China and in Japan, where the company holds most of its granted patents (66 granted patents). Its compatriot **COMPANY XXX** is the 2nd current IP holder in Japan with 22 granted patents. However, despite having the 2nd largest portfolio, **COMPANY XXX** is only significantly present in Japan in term of granted patents. In China, among the 6 main current IP holders, 4 are Chinese universities. In the USA, **COMPANY XXX** and **COMPANY XXX**, both academic applicants, are 2nd and 3rd current IP holders behind **COMPANY XXX**. In Europe, the main current IP holder is the Irish **COMPANY XXX** (5 granted patents), before **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX**.

Patented Technology by Products

REPORT
SAMPLE

	Portfolio	Contrast agents	Devices & Apparatus		
			All Devices	Handheld Probes	Catheters
TOTAL	921	xx	xx	49	xx
COMPANY XXX	278	31	xx	4	xx
COMPANY XXX	xx	4	xx	15	3
COMPANY XXX	xx	6	xx	xx	xx
COMPANY XXX	27	7	16	xx	5
COMPANY XXX	xx	xx	xx	xx	14
COMPANY XXX	xx	xx	12	xx	3
COMPANY XXX	20	xx	16	xx	xx
COMPANY XXX	xx	9	6	1	2
COMPANY XXX	xx	1	1	xx	1
COMPANY XXX	xx	3	xx	xx	1
COMPANY XXX	xx	13	xx	xx	xx
COMPANY XXX	11	xx	6	xx	xx
COMPANY XXX	11	3	xx	2	xx
COMPANY XXX	11	1	7	3	xx

Patents have been manually categorized based on review of title, abstract, claims and description. Note that a patent can be found in several categories.

Patents related to photoacoustic imaging address different technology issues. The most addressed issues concern imaging means and 2 main categories can be highlighted : contrast agents and devices. Indeed, even if the photoacoustic imaging technology doesn't require dyes or contrast agents, molecules are still designed in order to enhanced contrast and get a better image. **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX** are the most active in this technology. **COMPANY XXX** is a pharmaceutical company and its photoacoustic imaging patent portfolio is dedicated to contrast agents. Many devices are claims by applicants in their patent portfolios (653 families out of 921). **COMPANY XXX** and **COMPANY XXX** dedicate an important part of their portfolios to devices and apparatus, as well as most of the main patent applicants. Among the various devices, handheld probes and catheters are especially developed. **COMPANY XXX** is particularly focused on handheld probes, while **COMPANY XXX** concentrates on developing catheter associated with photoacoustic imaging.

Patented Technology by Applications

REPORT
SAMPLE

	Portfolio	Cancers & Tumors			Vascular Pathologies
		All Types	Breast	Prostate	
TOTAL	921	130	xx	xx	124
COMPANY XXX	278	xx	6	xx	5
COMPANY XXX	xx	xx	1	xx	xx
COMPANY XXX	xx	5	3	1	1
COMPANY XXX	27	4	1	1	xx
COMPANY XXX	xx	xx	xx	xx	xx
COMPANY XXX	xx	xx	3	1	6
COMPANY XXX	20	4	3	xx	xx
COMPANY XXX	xx	xx	4	3	8
COMPANY XXX	xx	xx	xx	xx	6
COMPANY XXX	xx	3	xx	xx	3
COMPANY XXX	xx	12	xx	xx	xx
COMPANY XXX	11	8	xx	xx	xx
COMPANY XXX	11	xx	xx	xx	xx
COMPANY XXX	11	xx	xx	xx	xx

Patents have been manually categorized based on review of title, abstract, claims and description. Note that a patent can be found in several categories.

Different applications are also claimed by applicants in the domain of photoacoustic imaging. Photoacoustic imaging is a biomedical technology and the most targeted applications are the diagnosis and treatment of cancers and vascular pathologies (blood vessel damages, cardiac pathologies, vascular brain damages,...). Those applications represent respectively 130 and 124 patent families of the whole photoacoustic imaging domain. **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX** are the most active in the cancer domain among the main applicants. The most targeted cancers are breast and prostate cancers. In cancer applications, patents disclose imaging means but also therapeutic agents. Those agents are coupled with a dye or a contrast agent. Photoacoustic also allows a good imaging of blood vessels either via external means or intravascular means and thus the technology is suitable for studying various vascular pathologies. Among the main applicants, **COMPANY XXX**, **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX** own the most patent families in this particular domain. In vascular pathologies, photoacoustic is used to get an image of the pathology and/or to perform live imaging during biopsy or surgery.

Summary of Applicant's Patent Portfolio (1/2)

REPORT
SAMPLE

Knowmade 2015 Patent Applicants	No. of patent families	Oldest priority date of the portfolio	No. of families filed / yr (average)	No. of patent documents	No. of patents / Family (average)	Patent average age (yr)	% granted	% pending	% dead (revoked lapsed expired)	No. of alive patents / Family (granted, pending)	No. of granted family patents by country			
											US	EP	JP	CN
COMPANY XXX	278	20xx	xx	xx	xx	2	xx%	xx%	xx%	3,1	23	xx	66	xx
COMPANY XXX	xx	20xx	13	xx	2,7	xx	7%	xx%	xx%	xx	1	xx	22	xx
COMPANY XXX	xx	1996	xx	138	xx	xx	xx%	xx%	xx%	3,4	xx	2	xx	xx
COMPANY XXX	27	20xx	xx	xx	xx	4	xx%	xx%	xx%	4,9	5	xx	xx	5
COMPANY XXX	xx	2011	xx	52	xx	xx	8%	88%	4%	1,9	2	xx	xx	xx
COMPANY XXX	xx	19xx	xx	xx	1	5	xx%	xx%	xx%	xx	9	xx	xx	xx
COMPANY XXX	20	20xx	xx	xx	1	xx	65%	xx%	xx%	0,8	xx	xx	xx	13
COMPANY XXX	xx	1996	1	xx	4,7	xx	xx%	xx%	xx%	2,8	xx	2	xx	xx
COMPANY XXX	xx	20xx	xx	31	xx	1	xx%	xx%	xx%	xx	3	xx	xx	xx
COMPANY XXX	xx	20xx	xx	136	9,7	xx	xx%	xx%	xx%	5,1	xx	xx	1	xx
COMPANY XXX	xx	19xx	1	xx	19,2	12	10%	2%	88%	2,2	xx	5	xx	xx
COMPANY XXX	11	20xx	xx	11	1	xx	xx%	xx%	xx%	xx	xx	xx	xx	7
COMPANY XXX	11	2011	xx	39	xx	<1	xx%	xx%	xx%	xx	1	1	xx	xx
COMPANY XXX	11	2011	xx	xx	xx	1	xx%	xx%	xx%	xx	xx	xx	xx	2

■ highest value in column
■ lowest value in column

Summary of Applicant's Patent Portfolio (2/2)

REPORT
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Globally, the activity of the main applicants in the photoacoustic imaging domain is quite recent and the portfolio of almost all of them is composed of more pending patents than granted patents, indicating a current general interest for the photoacoustic imaging technology.

Two companies, **COMPANY XXX** and especially **COMPANY XXX**, stand out by the size of their portfolio. **COMPANY XXX** filed its first application in 20xx but the company already owns a very high number of patent families which are composed of many patent documents. In average, **COMPANY XXX** filed xx patent families per year since 20xx. The company already holds granted patents in several countries, especially in Japan, the USA and China. Taking into account the number of pending patents the company filed across the world, the size of **COMPANY XXX**'s granted portfolio should increase greatly in the coming years. To a lesser extent, **COMPANY XXX** is showing the same profile.

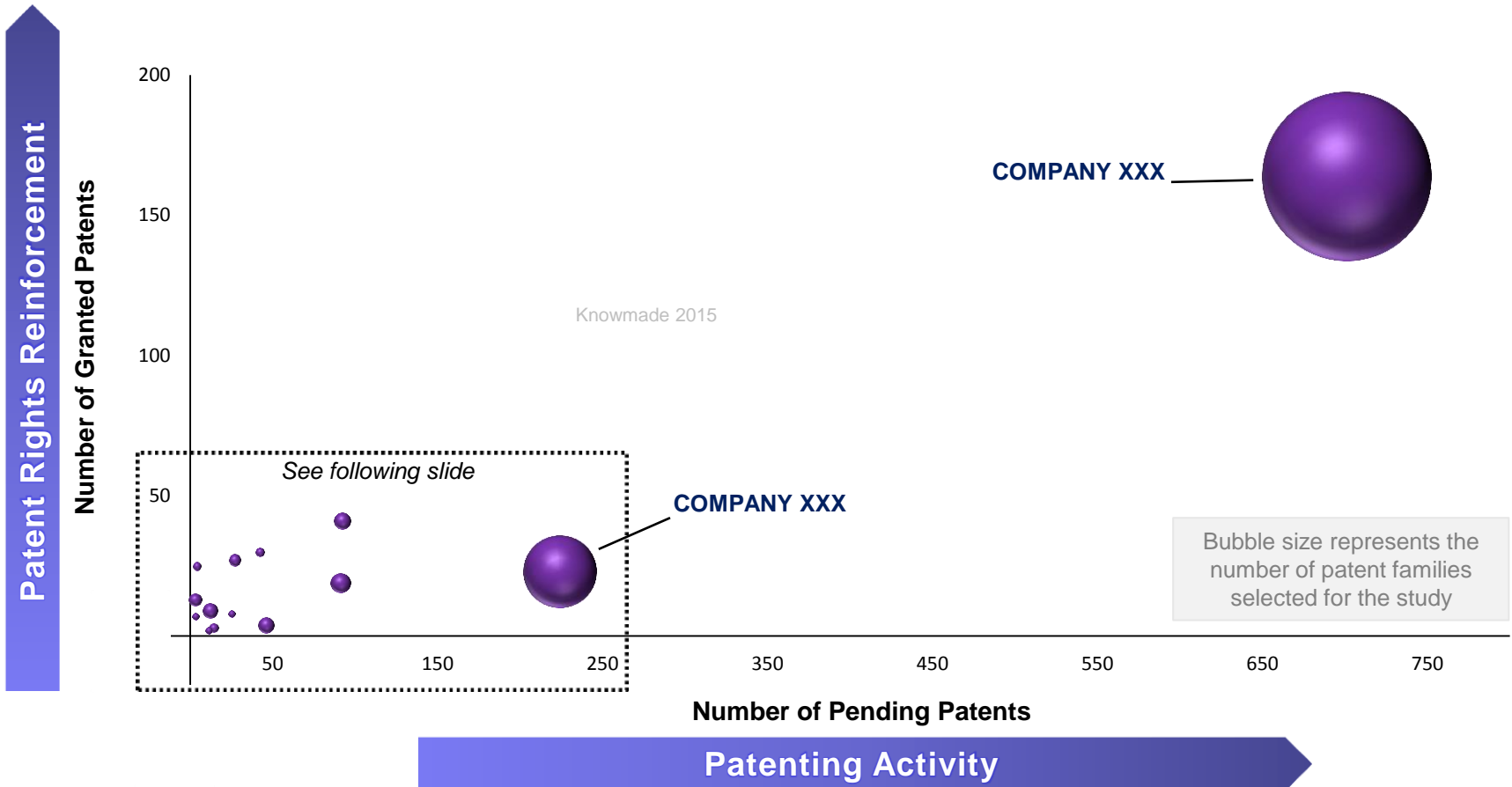
COMPANY XXX holds one of the oldest portfolio in the photoacoustic imaging technology (oldest priority date : 19xx, average age of patents : 12 years). The pharmaceutical company owns xx patent documents split in xx families, which gives **COMPANY XXX** the highest average of patents per family (19,2), revealing a worldwide IP strategy. However, many of those patents are dead (88%) and the company has the lowest level of pending patents (2%). **COMPANY XXX** has reduced its activity in the photoacoustic imaging domain, the company hasn't made any new application in the field since 20xx.

The American company **COMPANY XXX** started its patent activity in the photoacoustic imaging field in 2011 and already owns xx patent families composed of 52 patent documents, the company is ranked 5th of the main applicants. **COMPANY XXX** also shows the highest ratio of pending patents in a portfolio (88%). Noteworthy, **COMPANY XXX** was acquired by **COMPANY XXX** (xth of the main applicants) in February 2015 for \$1,2 billion.

The Chinese **COMPANY XXX** and **COMPANY XXX** have the highest level of granted patents (65% and xx% respectively), but all applications were only filed in China. Among academic applicants, the German **COMPANY XXX** has the most international strategy with granted and/or pending patents in many countries, especially Europe, USA, Japan and China.

Leadership of Patent Applicants (1/2)

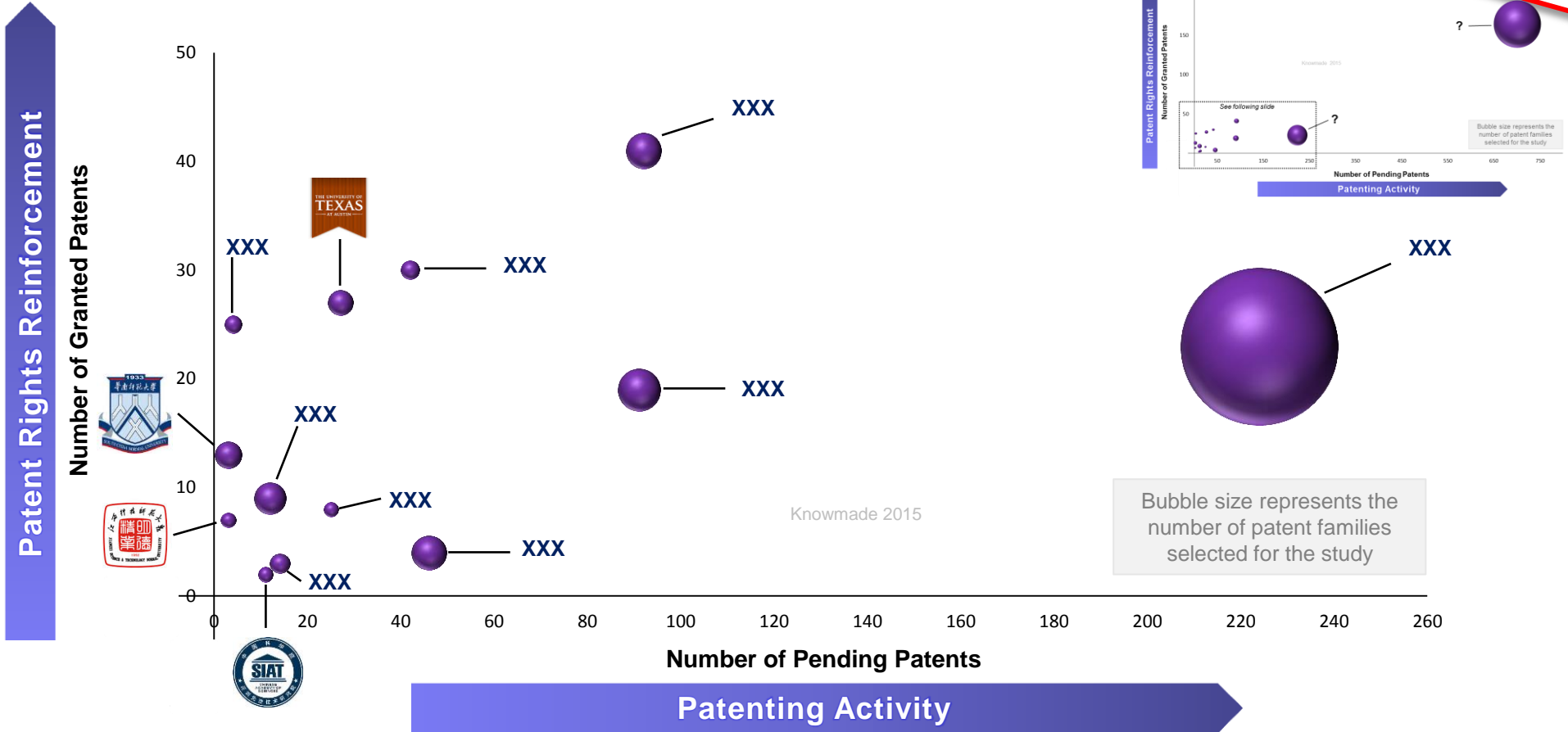
REPORT
SAMPLE



COMPANY XXX really stands out as the leader of patent applicants. **COMPANY XXX** is the main IP holder (patent rights reinforcement) and also the main current applicant (patenting activity) giving the company a very strong and significant leadership in term of patents in the photoacoustic imaging domain. **COMPANY XXX** also has a significant leadership, expanding greatly its portfolio with many new applications (strong patenting activity with xx patents currently pending). The leadership status of the other main applicants is analyzed in the following slide in a zoom in chart (dotted frame).

Leadership of Patent Applicants (2/2)

REPORT SAMPLE



The companies **COMPANY XXX** and **COMPANY XXX** have a significant patenting activity associated with already granted patents giving them a sizeable IP significance. Among the main academic applicants, **COMPANY XXX** and **COMPANY XXX** are the most active. Thus, **COMPANY XXX** is showing a great superiority but the other patent applicants are also pretty active in the photoacoustic imaging domain.



COMPANY XXX



COMPANY XXX



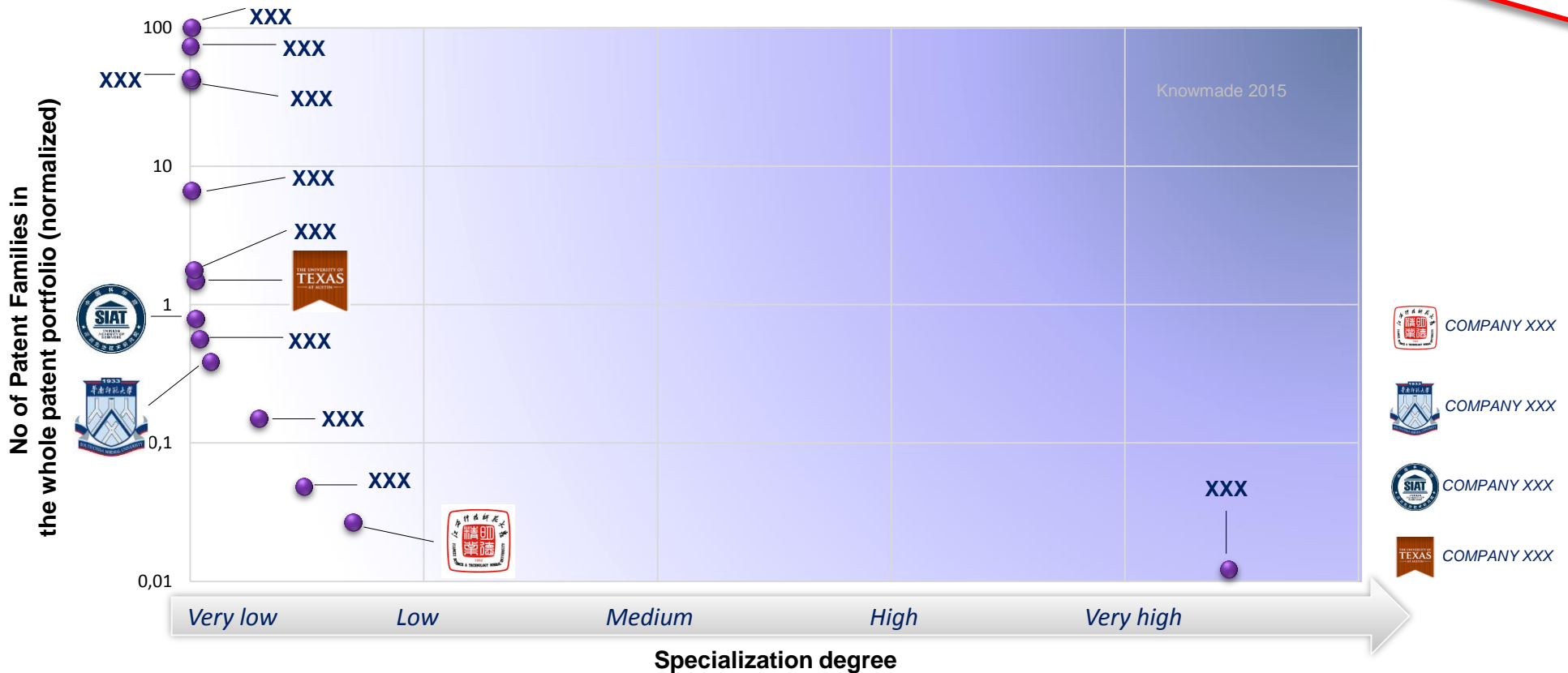
COMPANY XXX



COMPANY XXX

Degree of Specialization in Photoacoustic Imaging

REPORT SAMPLE



Specialization degree: The specialization degree of a company represents the percentage of patents filed in a specific field over the whole patent portfolio of the company. It is an indicator of the patenting activity on a specific field.

Companies like **COMPANY XXX**, **COMPANY XXX**, **COMPANY XXX** or **COMPANY XXX** cover a wide range of technologies with their patent portfolios and therefore have a **very low specialization degree**. **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX** have a slightly higher specialization degree. **COMPANY XXX** stands out with a very high specialization degree, its portfolio is mainly dedicated to photoacoustic imaging. **COMPANY XXX** is an IP pure player in photoacoustic imaging technology, working especially on imaging probes and systems.

Impact Factor of Patent Portfolios (1/2)

REPORT
SAMPLE

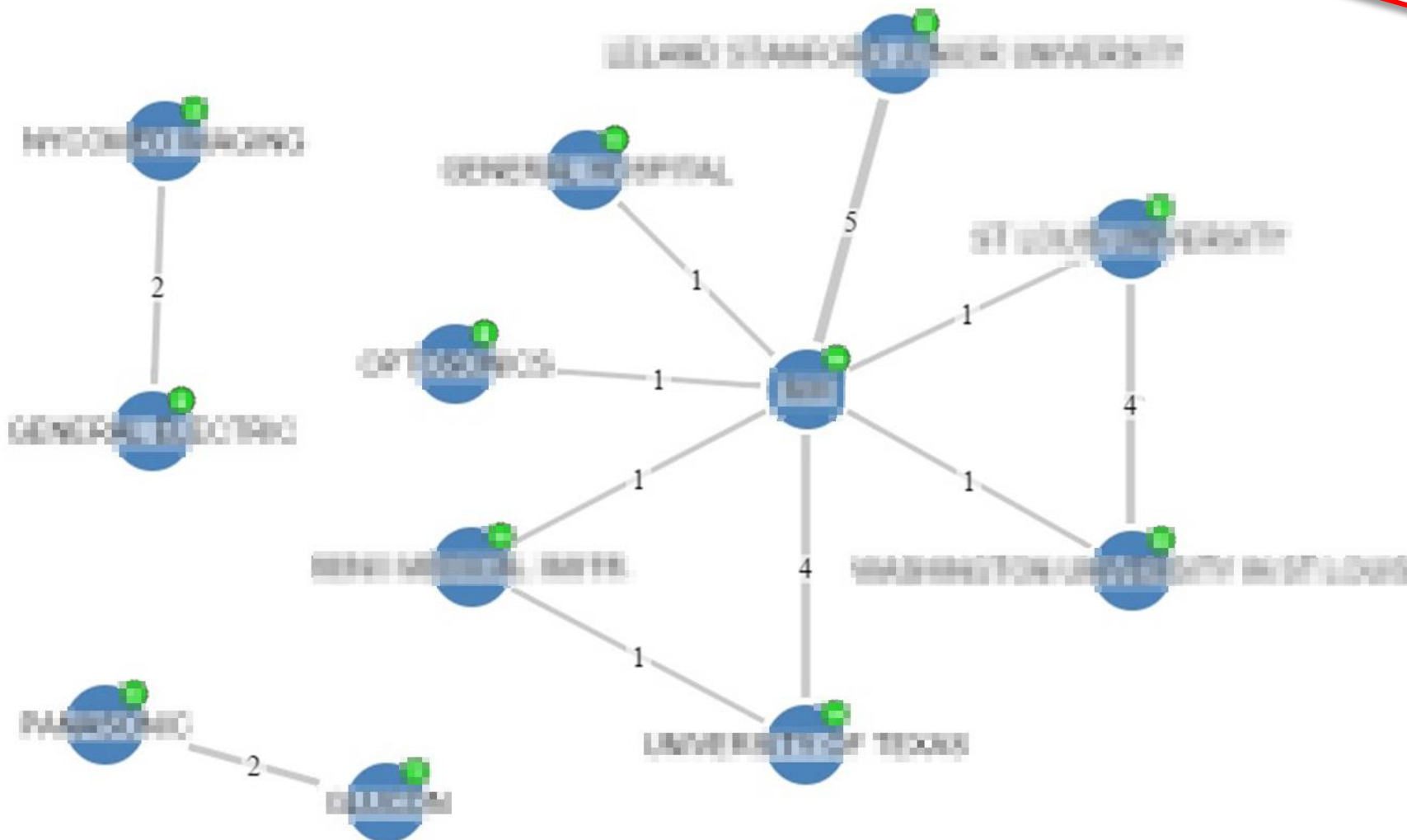
Knowmade 2015	A	B	C	D	E
Patent Applicants	No. of patent families	No. of citing patent families (excluding self-citations)	No. of citing patent families / patent family = B/A	Relative Impact Factor of the patent families = C / 1,93 *	Strength index of the patent portfolio = A x D
COMPANY XXX	278	xx	xx	xx	55,4
COMPANY XXX	xx	29	xx	xx	xx
COMPANY XXX	xx	xx	5,5	2,8	xx
COMPANY XXX	27	xx	xx	xx	xx
COMPANY XXX	xx	xx	0,2	0,1	xx
COMPANY XXX	xx	247	xx	xx	128
COMPANY XXX	20	xx	xx	xx	xx
COMPANY XXX	xx	xx	12,2	6,3	xx
COMPANY XXX	xx	xx	0,2	0,1	1,6
COMPANY XXX	xx	25	xx	xx	13
COMPANY XXX	xx	xx	12,2	6,3	xx
COMPANY XXX	11	xx	xx	xx	xx
COMPANY XXX	11	0	0	0	0
COMPANY XXX	11	0	0	0	0

■ highest value in column
■ lowest value in column

*921 patent families are cited by the whole of the 1,773 patent families, thus corresponding to an average of 1,93 citing patent families per patent family. A relative impact factor of 1 indicates that the portfolio is in the average range of citations. A relative factor of 2 indicates that the portfolio has two times more citations than the average, while a relative impact factor of 0.5 indicates that the portfolio is half that of the average.

Patent Applicant IP Network

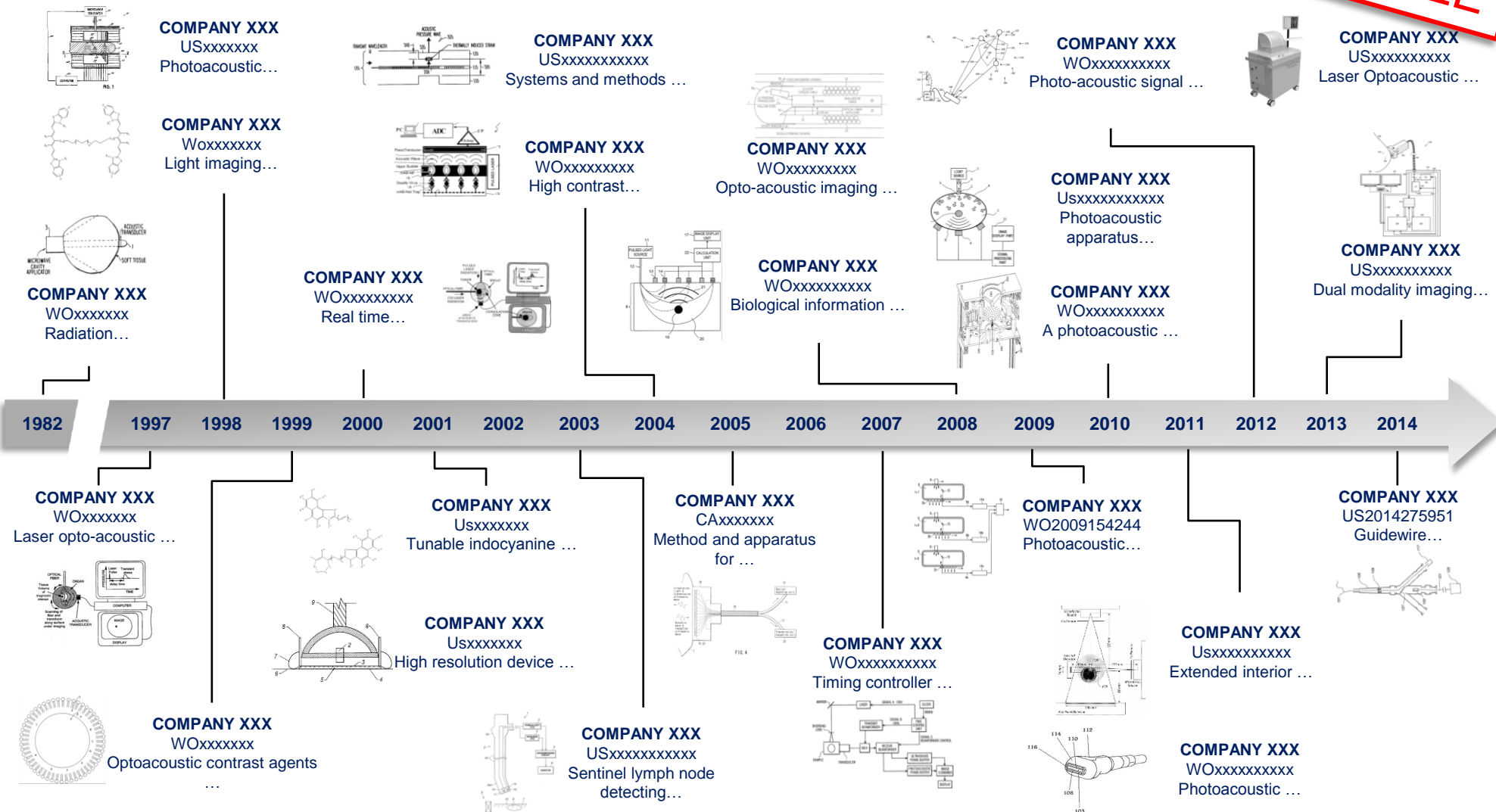
REPORT
SAMPLE



Number in black on each link between applicants is the number of co-assigned patent families in the data set of the study.
Number up right to each bubble is the number of patent families for this applicant in the data set of the study.
Bubble size is proportional to the number of patent families selected for the study.

Key Patent Families (1/2)

**REPORT
SAMPLE**



The selection of key patent families is based on the family size, current legal status of patents, citations analysis and impact on the technological segment. See annexes for methodology for key patent identification. Patent numbers correspond to representative member of the families, assignee names take into account original applicants and reassignments.

Granted Patents Near Expiration (1/2)

REPORT
SAMPLE

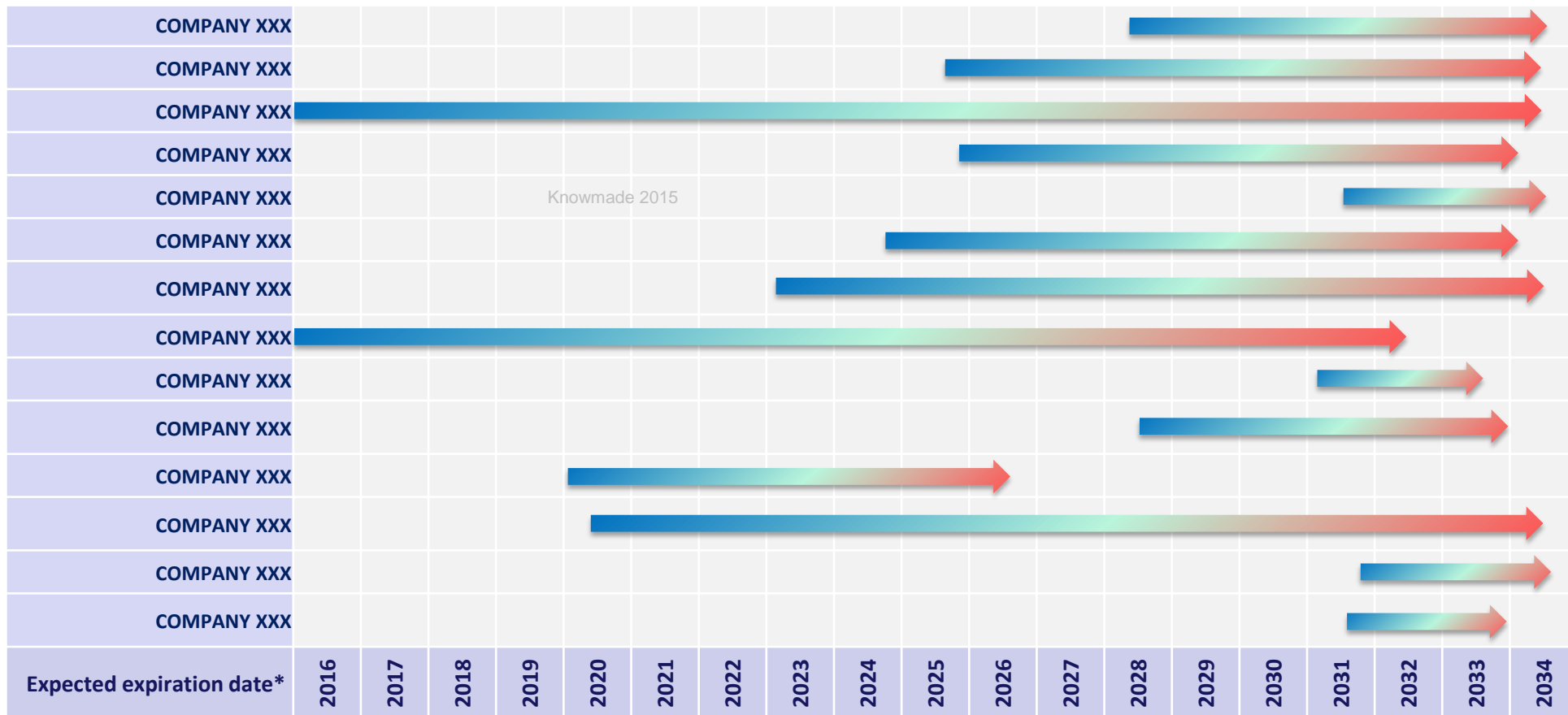
Knowmade 2015	Assignee	Title	Publication Number	PDF	Expected Expiration Date *
	COMPANY XXX	Time-resolved...	USxxxxxxx	Open	2016-01-31
	COMPANY XXX	Real time..	USxxxxxxx	Open	2016-01-31
	COMPANY XXX	Optoacoustic imaging...	USxxxxxxx	Open	2016-01-31
	COMPANY XXX	Photoacoustic...	USxxxxxxx	Open	2016-10-04
	COMPANY XXX	Photoacoustic...	USxxxxxxx	Open	2016-10-04
	COMPANY XXX	Photoacoustic...	CAxxxxxxx	Open	2016-10-11
	COMPANY XXX	Laser opto-acoustic...	AUxxxxxxx	Open	2017-01-31
	COMPANY XXX	Laser opto-acoustic...	EPxxxxxxx	Open	2017-01-31
	COMPANY XXX	Opto akustische laser...	DExxxxxxx	Open	2017-01-31
	COMPANY XXX	Laser opto-acoustic...	CAxxxxxxx	Open	2017-01-31
	COMPANY XXX	Method and system for...	AUxxxxxxx	Open	2017-03-21
	COMPANY XXX	Photoacoustic...	AUxxxxxxx	Open	2017-10-01
	COMPANY XXX	Photoacoustic...	EPxxxxxxx	Open	2017-10-01
	COMPANY XXX	Photoakustische...	DExxxxxxx	Open	2017-10-01
	COMPANY XXX	Optical acoustic...	JPxxxxxxx	Open	2017-10-01
	COMPANY XXX	Compounds	USxxxxxxx	Open	2018-04-28
	COMPANY XXX	Light imaging...	EPxxxxxxx	Open	2018-04-28
	COMPANY XXX	Agentes de contraste...	ESxxxxxxx	Open	2018-04-28

* Expected Expiration Date is dependent on the accuracy and timeliness of the information provided by the patent offices. This indicator may change at any time without notice based on new information received from the patent offices. No decision should be made based solely on this indicators.

Granted Patents Near Expiration (2/2)

REPORT
SAMPLE

Expected Expiration Period for Current Granted Portfolio

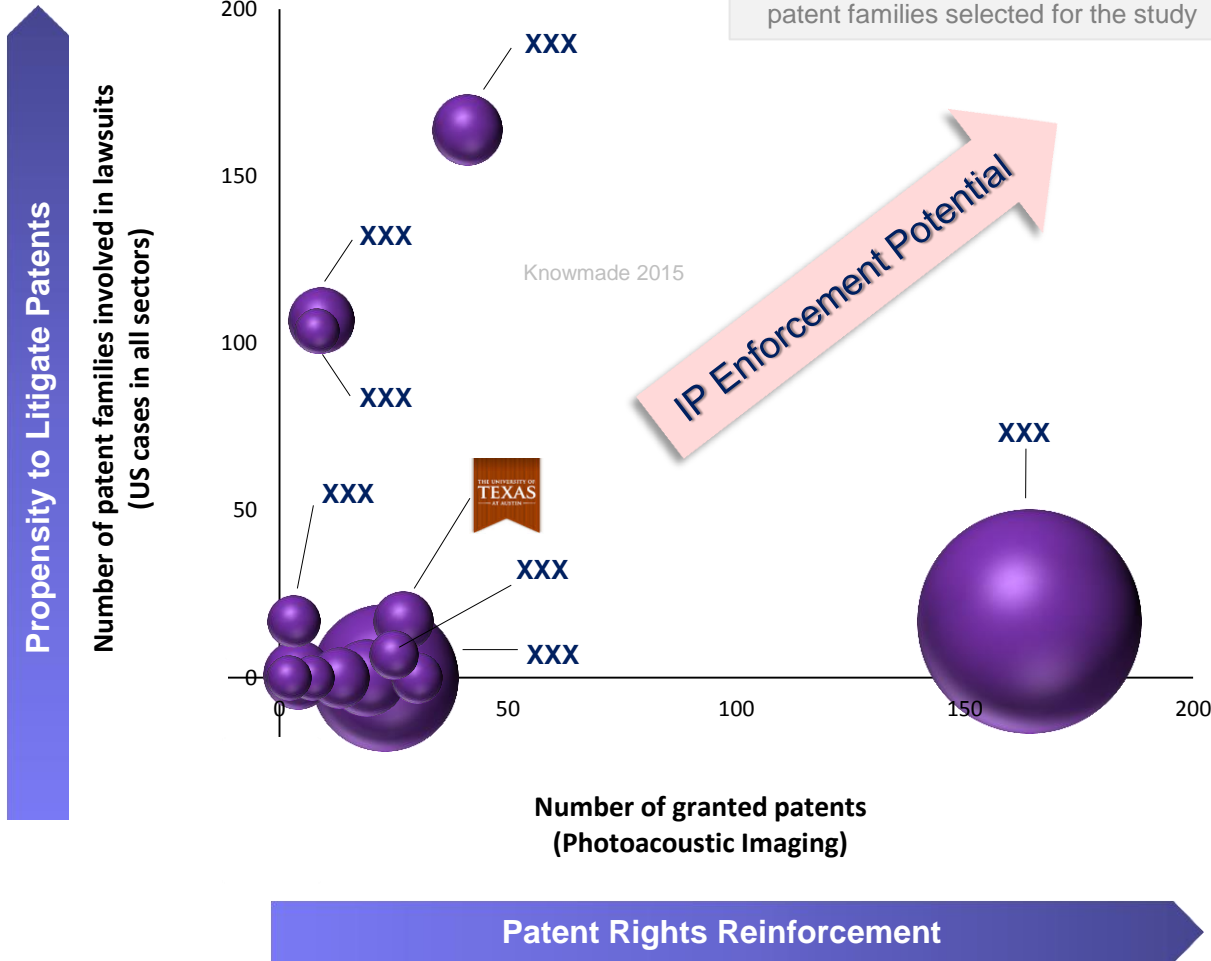


For example, the oldest patents of **COMPANY XXX**'s current granted portfolio are expected to expire early-2028 and the latest patents currently granted should expire mid-2034.

* *Expected Expiration Date is dependent on the accuracy and timeliness of the information provided by the patent offices. This indicator may change at any time without notice based on new information received from the patent offices. No decision should be made based solely on this indicators.*

Potential Future Plaintiffs

**REPORT
SAMPLE**



To this date, no litigation case related to photoacoustic imaging has been filed in the US. **COMPANY XXX**, **COMPANY XXX** and **COMPANY XXX** have a certain propensity to litigate their patents. But only a few of **COMPANY XXX**'s patents in the photoacoustic imaging field are granted as the company arrived recently in the domain. **COMPANY XXX** and mostly **COMPANY XXX** have a significant IP Enforcement Potential. The IP Enforcement Potential of **COMPANY XXX** may increase with the acquisition of **COMPANY XXX** in February 2015. **COMPANY XXX** is the leader of the photoacoustic imaging domain by the size of its portfolio, however, the company has filed lawsuits in the US only a few times and its IP Enforcement Potential is thus rather low.

The photoacoustic imaging domain emerged in term of patents less than 20 years ago and the number of new patents has been increasing greatly only recently. Photoacoustic imaging devices are already available (**COMPANY XXX**, **COMPANY XXX**) for pre-clinical research. And **COMPANY XXX**'s device just received the CE Mark in Europe in late 2014 and is currently undergoing FDA approval in the USA. Thus, the technology is just appearing in the clinical field and patent litigation cases can be expected in the future.

COMPANY XXX

**REPORT
SAMPLE**

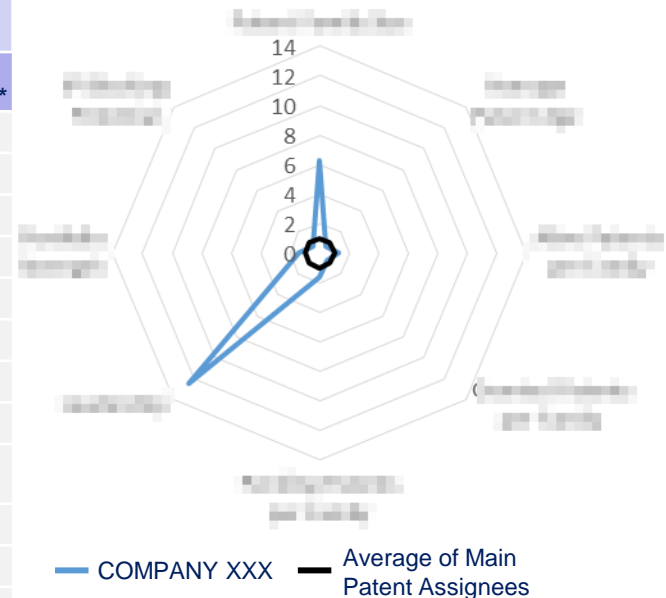
Patenting activity

- Very XXXX patent portfolio (xxx patents within xxx patent families)
- Oldest priority date: 20xx
- Patent average age: xx years
- Main countries of patent filings: XX, XX
- xxx granted patents (main country : XX)
- xxx pending patents

Impact of Patent Portfolio

- XXXX IP Blocking Potential (xxx forward citations by xxx patent applicants)
- XXXX IP Enforcement Potential (XXX propensity to litigate patents, and xxx patents in-force mainly in XX)

Knowledge 2015	Title of Granted Patents Near Expiration	Publication Number	PDF	Expected Expiration Date*
	Organism information...	JPxxxxxxxxxx	Open	2028-04-01
	Organism information...	JPxxxxxxxxxx	Open	2028-04-01
	Organism information...	JPxxxxxxxxxx	Open	2028-04-01
	Suffering inspection body...	JPxxxxxxxxxx	Open	2028-04-01
	Biological information...	EPxxxxxxxx	Open	2028-05-12
	Biological information...	USxxxxxxxx	Open	2028-05-12
	Biological information..	CNxxxxxxxx	Open	2028-05-12
	Organism information...	JPxxxxxxxxxx	Open	2028-05-20
	The survey instrument ...	JPxxxxxxxxxx	Open	2028-06-04
	Biological information...	USxxxxxxxxxxx	Open	2028-06-20
	Ultrasonic probe...	USxxxxxxxxxxx	Open	2028-06-24
	Organism information...	JPxxxxxxxxxx	Open	2028-08-05
	Imaging device and...	JPxxxxxxxxxx	Open	2028-08-20
	Biological information...	USxxxxxxxxxxx	Open	2028-08-27



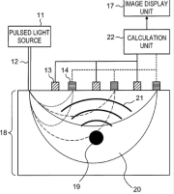
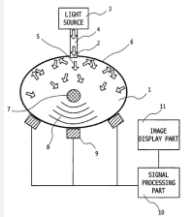
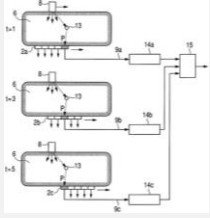
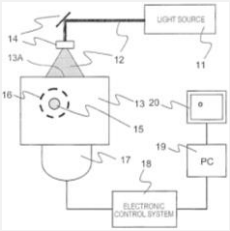
Note that the average of main patent assignee is set at 1 and the company values are normalized by the average of main patent assignees.

* Expected Expiration Date is dependent on the accuracy and timeliness of the information provided by the patent offices. This indicator may change at any time without notice based on new information received from the patent offices. No decision should be made based solely on this indicators.

COMPANY XXX

**REPORT
SAMPLE**

Main Key Patent Families

Patent Family	Distinctive Features
<p>WOxxxxxxxxxx Biological information... (2008)</p> 	<ul style="list-style-type: none"> • Mutual use of... • Extended family via a PCT procedure, with patents pending in EP and JP and patents granted in US (2), JP (3), CN • 27 forward citations
<p>USxxxxxxxxxxx Photoacoustic... (2010)</p> 	<ul style="list-style-type: none"> • Photoacoustic apparatus and... • Granted patents in US (2) and JP (2) • 24 forward citations
<p>WOxxxxxxxxxx Photoacoustic... (2009)</p> 	<ul style="list-style-type: none"> • Bioinformation acquisition apparatus... • PCT procedure. Granted patents in JP (3), US and CN (3), pending patents in EP and US. • 16 forward citations
<p>WOxxxxxxxxxx Device for... (2010)</p> 	<ul style="list-style-type: none"> • Obtaining an image... • PCT procedure. Granted patents in JP and CN, pending patents in JP, EP and US. • 16 forward citations

Excel Database

with all patents analyzed in the report with technology segmentation



This database allows multi-criteria searches and includes patent publication number, hyperlinks to the original documents, priority date, title, abstract, patent assignees, and legal status for each member of the patent family.

	A	B	C	D	E	F	G
1	PATENT NUMBER	PATENT APPLICANT	PRIORITY DATE	TITLE	ABSTRACT	PDF	LEGAL STATUS
2	WO/2015/18258	BOEYNS MEDICAL	1987-04-08	Radiation-induced pharmaceuticals	The acoustic waves generated by incident	Open	LEGAL DETAILS FOR WO/2015/18258
3	EP-2787293	BOEYNS MEDICAL	1987-04-08	Radiation-induced pharmaceuticals	The acoustic waves generated by incident	Open	LEGAL DETAILS FOR EP-2787293
4	GB9702541	NYCOBIO MEDICAL	1987-04-08	Composites	This invention provides a physiologically	Open	LEGAL DETAILS FOR GB9702541
5	AU9702541	NYCOBIO MEDICAL	1987-04-08	Method of demersing tissue	This invention provides a physiologically	Open	LEGAL DETAILS FOR AU9702541
6	US4787293	UNIVERSITY OF MICHIGAN	1987-04-08	Radiation-induced pharmaceuticals	The acoustic waves generated by incident	Open	LEGAL DETAILS FOR US4787293
7	GB9702541	NYCOBIO MEDICAL	1987-04-08	Light imaging contrast agents	The invention includes a physiologically	Open	LEGAL DETAILS FOR GB9702541
8	WO/2015/18258	NYCOBIO MEDICAL	1987-04-08	Method of demersing tissue	This invention provides a method of	Open	LEGAL DETAILS FOR WO/2015/18258
9	CA18258	BOEYNS MEDICAL	1987-04-08	Radiation-induced pharmaceuticals	The acoustic waves generated by incident	Open	LEGAL DETAILS FOR CA18258
10	EP-2787293	UNIVERSITY OF	1987-04-08	Method and system for 3-D acoustic	A method and system for 3-D acoustic	Open	LEGAL DETAILS FOR EP-2787293
11	EP18258	OPTEONICS (P) LTD	1987-04-08	Thermoacoustic tissue contrast	Methods and apparatus for measuring and	Open	LEGAL DETAILS FOR EP18258
12	CA2787293	UNIVERSITY OF	1987-04-08	Method and system for 3-D acoustic	A method and system for 3-D acoustic	Open	LEGAL DETAILS FOR CA2787293
13	WO/2015/18258	UNIVERSITY OF MICHIGAN	1987-04-08	Real time photoacoustic monitoring of	The present invention is directed to a	Open	LEGAL DETAILS FOR WO/2015/18258
14	GB9702541	NYCOBIO MEDICAL	1987-04-08	Method	The invention includes a method of	Open	LEGAL DETAILS FOR GB9702541
15	BR9702541	OPTEONICS (P) LTD	1987-04-08	Scanner for transverse para-normal	Methods and apparatus for measuring and	Open	LEGAL DETAILS FOR BR9702541
16	GB2787293	UNIVERSITY OF	2005-04-08	Apparatus and method for analyzing	There is disclosed an apparatus for analyzing	Open	LEGAL DETAILS FOR GB2787293
17	CA2787293	OPTEONICS (P) LTD	1987-04-08	Thermoacoustic tissue contrast	Methods and apparatus for measuring and	Open	LEGAL DETAILS FOR CA2787293
18	NO18258	OPTEONICS (P) LTD	1987-04-08	Forbedrettsmiddel	Methods and apparatus for measuring and	Open	LEGAL DETAILS FOR NO18258
19	DE4787293	SILICON LABS	1987-04-08	PHOTO-ACOUSTIC SENSOR	A photo-acoustic device for a transverse para-	Open	LEGAL DETAILS FOR DE4787293
20	AU9702541	NYCOBIO MEDICAL	1987-04-08	Compounds	This invention provides a physiologically	Open	LEGAL DETAILS FOR AU9702541
21	BR9702541	OPTEONICS (P) LTD	1987-04-08	Dispositivo de medida de forma	Methods and apparatus for measuring and	Open	LEGAL DETAILS FOR BR9702541
22	AU9702541	NYCOBIO MEDICAL	1987-04-08	Methods of photoacoustic imaging	The invention includes a method of	Open	LEGAL DETAILS FOR AU9702541
23	ATE2787293	AMPHIPHILIC	1987-04-08	Verfahren zur photoakustischen	The invention includes a method of	Open	LEGAL DETAILS FOR ATE2787293
24	AU9702541	NYCOBIO MEDICAL	1987-04-08	Methods and apparatus for medical	This invention provides a physiologically	Open	LEGAL DETAILS FOR AU9702541
25	WO/2015/18258	TOCOPHOL	1987-04-08	Methods and apparatus for medical	The invention provides a method of	Open	LEGAL DETAILS FOR WO/2015/18258
26	AU2787293	MALDENKROFT	2005-04-08	Carbocyanine dye for photoacoustic	Novel tumor specific photoacoustic and	Open	LEGAL DETAILS FOR AU2787293

Order Form

Biomedical Photoacoustic Imaging Patent Landscape

SHIP TO

Name (Mr/Ms/Dr/Pr):

Job Title:

Company:

Address:

City:

State:

Postcode/Zip:

Country:

VAT ID Number for EU members:

Tel:

Email:

Date:

PAYMENT METHODS

Check

To pay your invoice using a check, please mail your check to the following address:

KnowMade S.A.R.L.
2405 route des Dolines, BP 65
06902 Valbonne Sophia Antipolis
FRANCE

Money Transfer

To pay your invoice using a bank money wire transfer please contact your bank to complete this process. Here is the information that you will need to submit the payment:

Payee: KnowMade S.A.R.L.
Bank: Banque populaire St Laurent du Var CAP 3000 - Quartier du lac- 06700 St Laurent du Var
IBAN: FR76 1560 7000 6360 6214 5695 126
BIC/SWIFT: CCBPFRPPNCE

Paypal

In order to pay your invoice via PAYPAL, you must first register at www.paypal.com. Then you can send money to the KnowMade S.A.R.L. by entering our E-mail address contact@knowmade.fr as the recipient and entering the invoice amount.

RETURN ORDER BY

E-mail: contact@knowmade.fr

Mail: KnowMade S.A.R.L. 2405 route des Dolines, BP 65 06902 Sophia Antipolis FRANCE

PRODUCT ORDER

€2,990 – Single user license

€3,990 – Corporate license

For price in dollars, please use the day's exchange rate. For French customer, add 20% for VAT.

All reports are delivered electronically in pdf format at payment reception .

**Single user license means only one person at the company can use the report. Please be aware that our publication will be watermarked on each page with the name of the recipient and of the organization (the name mentioned on the PO). This watermark will also mention that the report sharing is not allowed.*

I hereby accept Knowmade's Terms and Conditions of Sale

Signature:

Terms and Conditions of Sales

Definitions

“Acceptance”: Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions “I hereby accept Knowmade’s Terms and Conditions of Sale”.

“Buyer”: Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

“Contracting Parties” or “Parties”: The Seller on the one hand and the Buyer on the other hand.

“Intellectual Property Rights” (“IPR”) means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

“License”: For the reports and databases, 2 different licenses are proposed. The buyer has to choose one license:

1. Single user license: a single individual at the company can use the report.
2. Corporate license: the report can be used by unlimited users within the company. Subsidiaries are not included.

“Products”: Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

“Seller”: Based in Sophia Antipolis (France headquarters), Knowmade is a technology intelligence company specialized in the research and analysis of scientific and technical information. We provide patent landscapes and scientific state of the art with high added value to businesses and research laboratories. Our intelligence digests play a key role to define your innovation and development strategy.

1. Scope

1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions “I hereby accept Knowmade’s Terms and Conditions of Sale”. This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer’s address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

2. Mailing of the Products

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or
- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer.

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including in cases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4 The mailing is operated through electronic means either by email via the sales department. If the Product’s electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects.

2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer’s risk.

Terms and Conditions of Sales

3. Price, invoicing and payment

3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Payments due by the Buyer shall be sent by cheque payable to Knowmade, PayPal or by electronic transfer to the following account:

Banque populaire St Laurent du Var CAP 3000 - Quartier du lac- 06700 St Laurent du Var

BIC or SWIFT code: CCBPFRPPNCE

IBAN : FR76 1560 7000 6360 6214 5695 126

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

4. Liabilities

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;

b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.

4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non-acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

5. Force majeure

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.



**2405 route des Dolines,
06902 Sophia Antipolis
France
Email : contact@knowmade.fr
Web: www.knowmade.com**