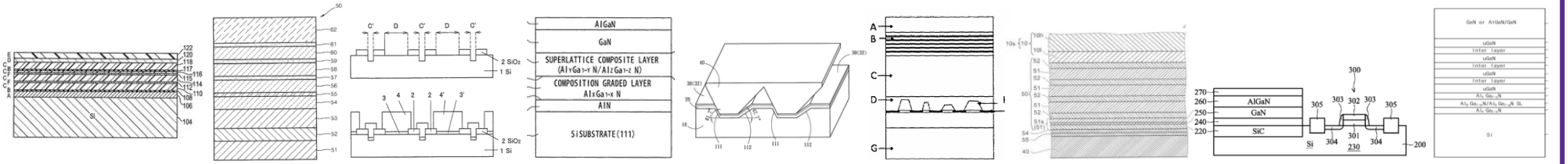
GaN-on-Si
Patent Investigation



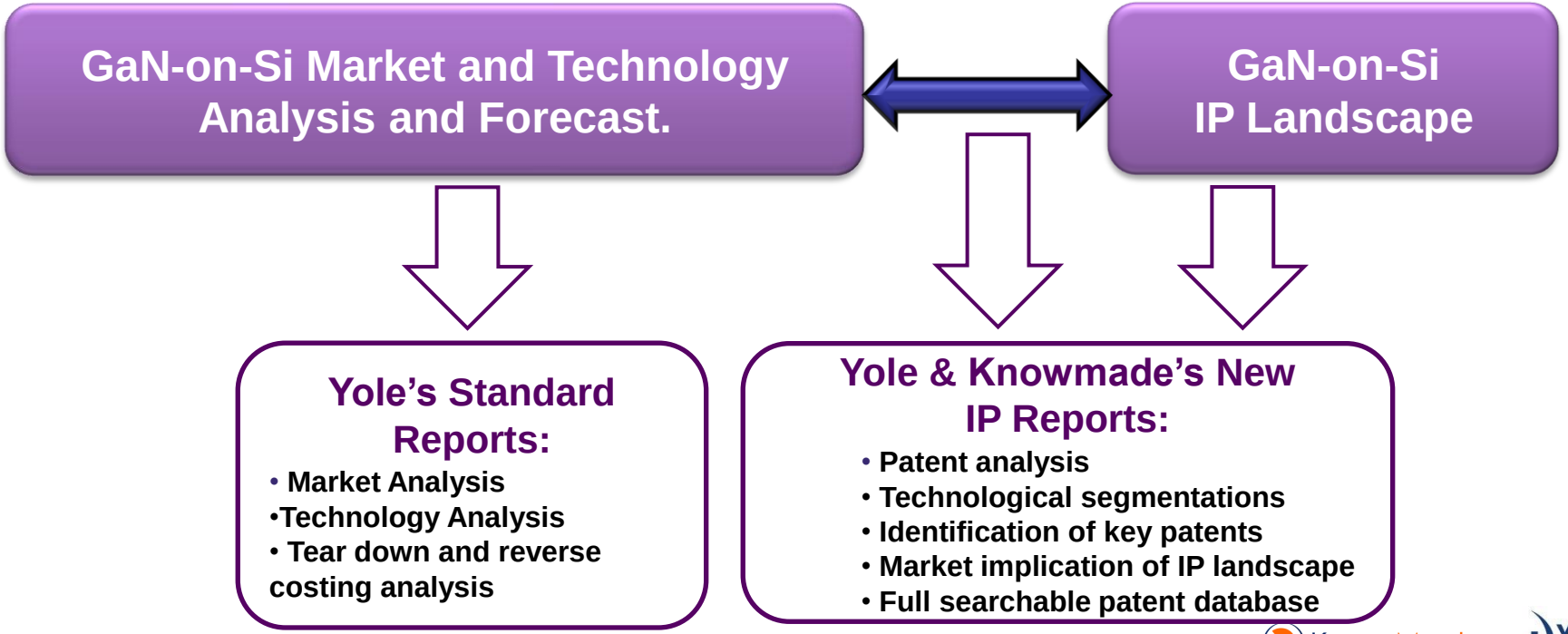
75 cours Emile Zola, F-69001 Lyon-Villeurbanne, France
Tel : +33 472 83 01 80 - Fax : +33 472 83 01 83
Web: http://www.yole.fr

2405 route des Dolines, 06902 Sophia Antipolis, France
Tel: +33 489 89 16 20
Web: http://www.knowmade.com

A New Type of Report Providing a Clear Link between IP Situation and Market Evolutions

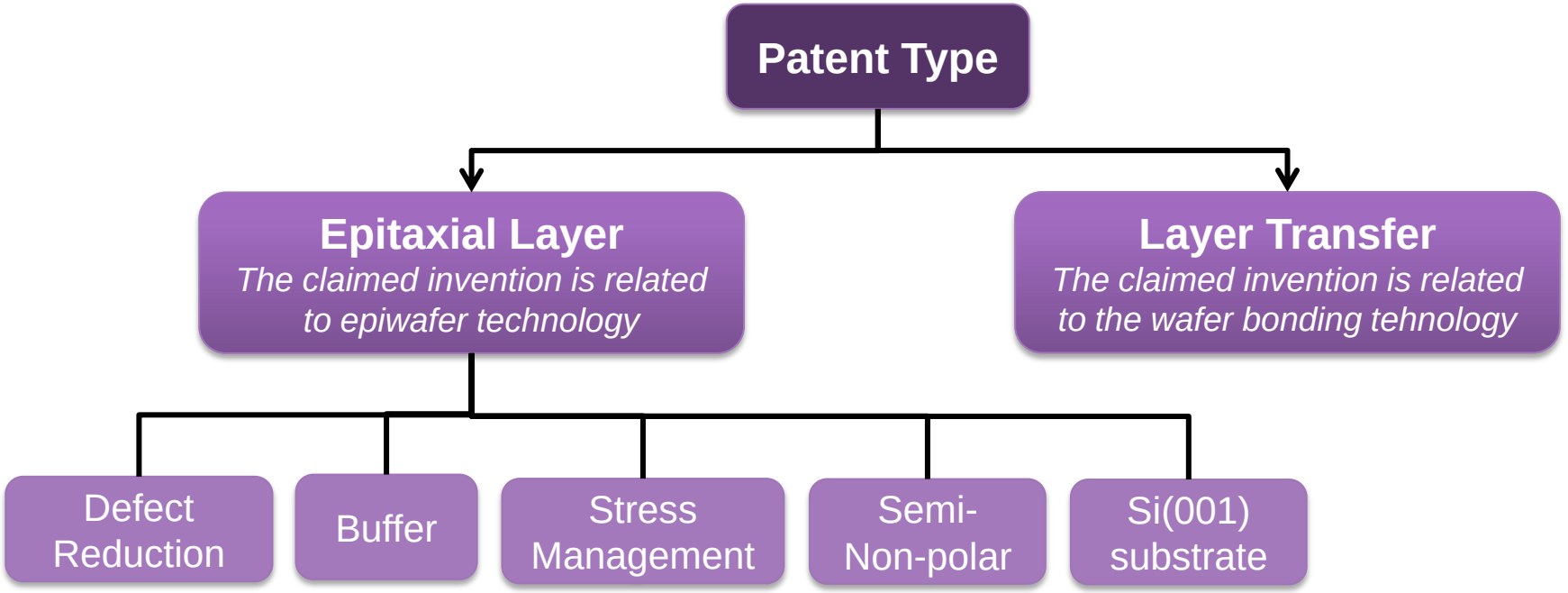
More than describing the status of the IP situation, this report provides a missing link between patented technological solutions and market, technological and business trends

- Knowmade has developed a unique methodology to define a technical segmentation of patent landscape and identify key patents.
- By combining their technical knowledge, business understanding and patent search, Yole and Knowmade are able to provide unique analysis and added value in this report
- In-depth technological analysis of patents provided in this report will lead to understanding of strategic decisions and positioning of key players within the value chain



Scope of the Report

- This report provides a detailed picture of the patent landscape for III-nitride materials grown on silicon substrate. Only patents related to growth technology and corresponding challenges (defect reduction, stress management …) were considered. This report does not include patents related to active layers or GaN-based devices.
- This report covers patents published worldwide up to December 2013. More than 560 patent families relevant to the scope of this report have been selected. Those have been manually segmented by type and organized in various technology segments as described below.
- Market data from Yole Développement are also provided to add some context regarding business trends and metrics.



Key Features of the Report (1/2)

- **The report provides essential patent data for GaN on Silicon substrate related to main material issues such as dislocation density reduction and stress management for preventing crack generation and warpage of the wafer.**
- **It identifies more than 50 holders of GaN-on-Si related intellectual property. It provides in-depth analysis of key technology segments and 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 20 companies.
- **A special focus is provided on key issues and approaches:**
  - Buffer type
  - Defect reduction
  - Stress management
  - Non/Semi polar
  - (001)-oriented silicon substrate
  - Layer Transfer Technology
- **The "GaN-on-Si IP" profiles of 15 major companies is presented, with key patents, technological issues, litigations, licenses, partnerships, IP strength and IP strategy.**
- **The**

Key Features of the Report (2/2)

- **The report also provides an extensive Excel database with all patents analyzed in the report with technology segmentation. This database allows multi-criteria searches:**

Patent information

- Patent publication number
- Hyperlinks to the original documents
- Priority date
- Title
- Abstract
- Patent Assignees
- Technological segments
- Legal status for each member of the patent family

Technological segments

- Buffer type
- Defect reduction
- Stress management
- Non/Semi polar
- (001)-oriented silicon substrate
- Layer transfer technology

- **This report does not provide** any insight analyses or counsel regarding legal aspects or the validity of any individual patent: Knowmade and Yole Développement are research firms 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.

Methodology (1/2)

- **The data were extracted from the FamPat worldwide database (Questel-ORBIT) which provides 80+ million patent documents from 95 offices.**
- **The patents search was performed in December 2013, hence patents published after this date will not be available in this report.**
- **The patent selection was done manually.**

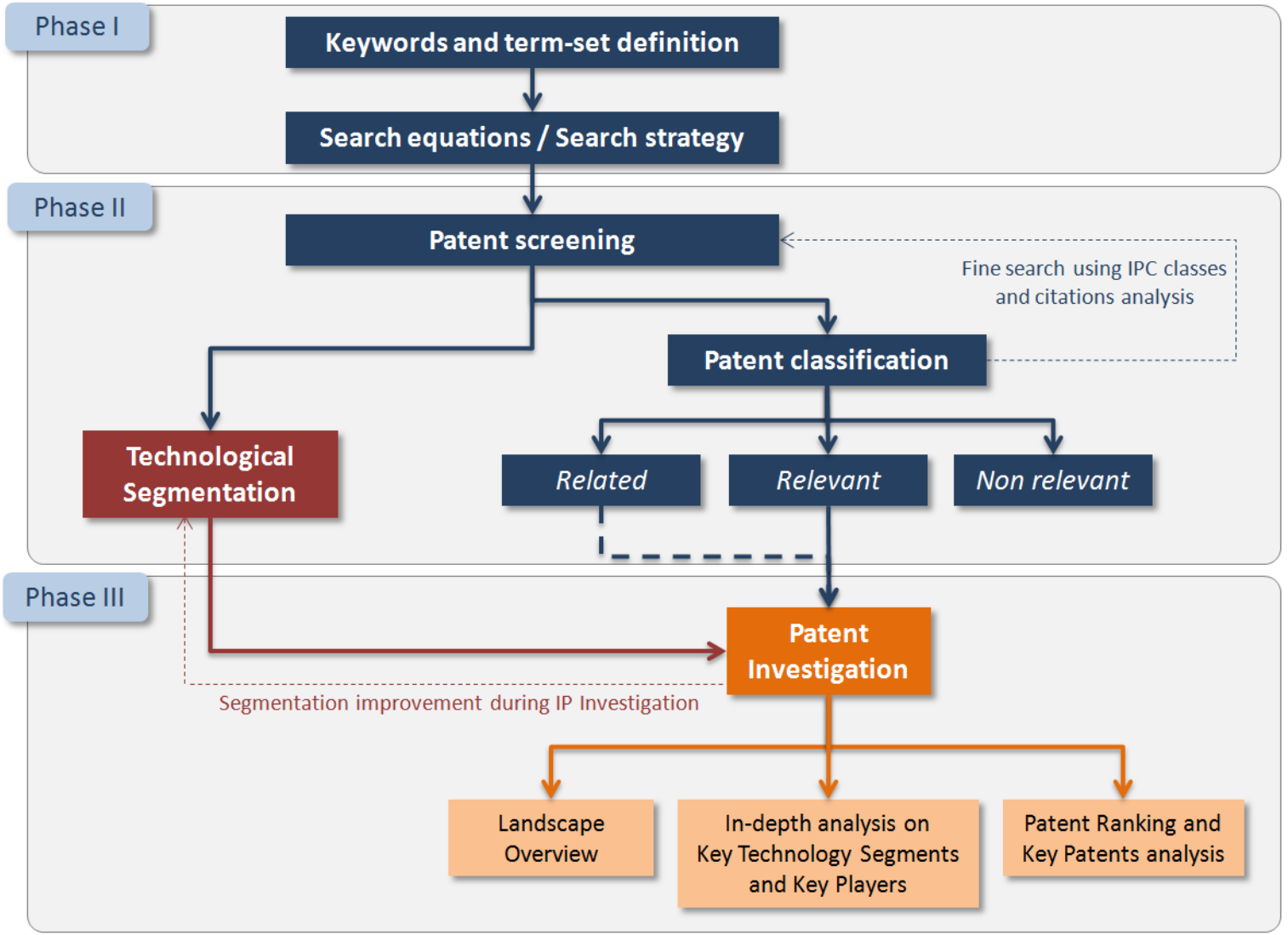
Number of selected patent families for the GaN-on-Si IP Investigation:

567 over a number of returned results > 8,600

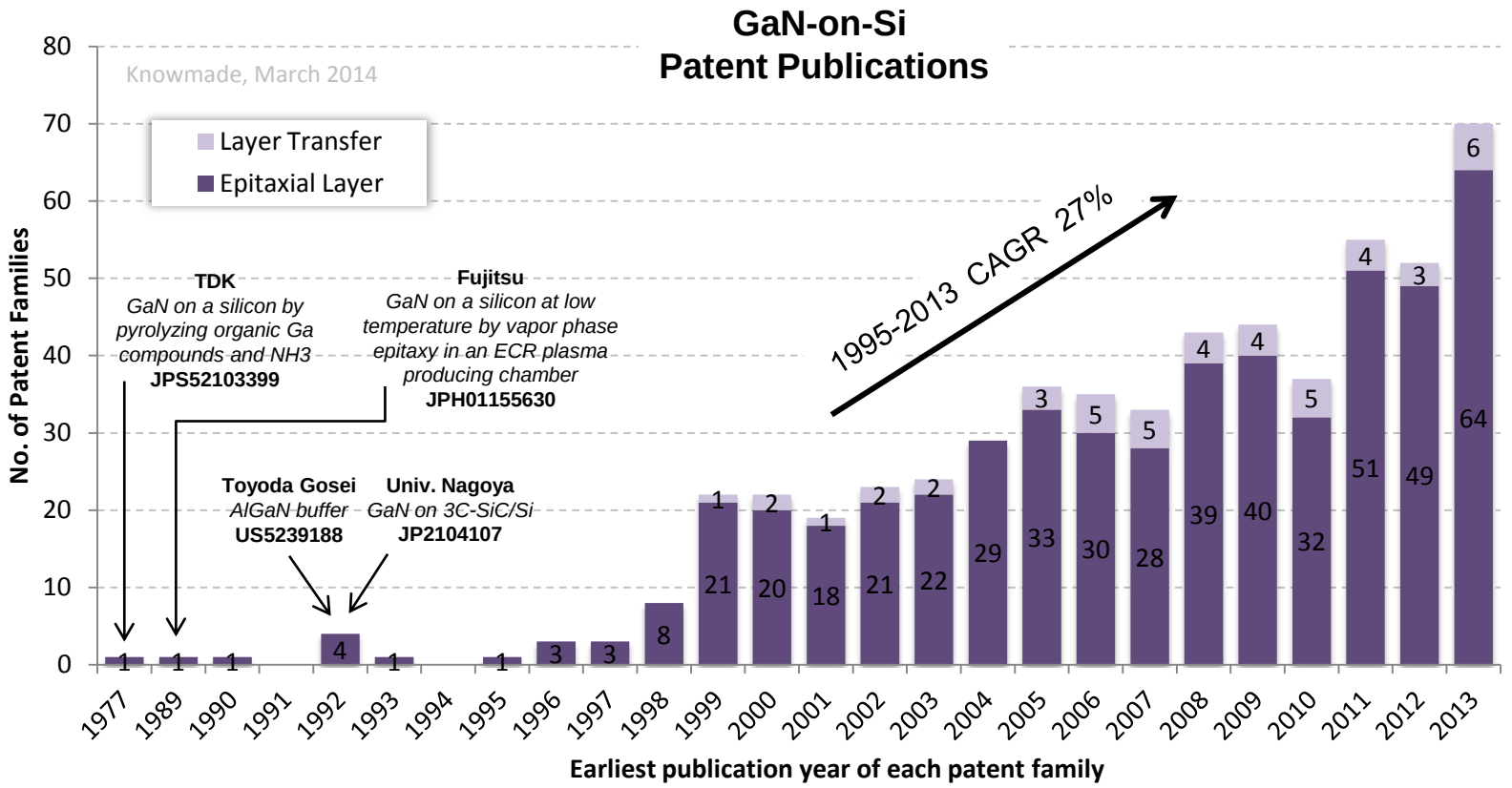
- **The statistical analysis was performed with INTELLIXIR System.**
- **The patents were manually categorized using keyword analysis of patent title, abstract and claims, in conjunction with expert review of the subject-matter of inventions (details in next slides).**
- **The patents were organized 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 and Yole Développement 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)



Time Evolution of Patent Publications

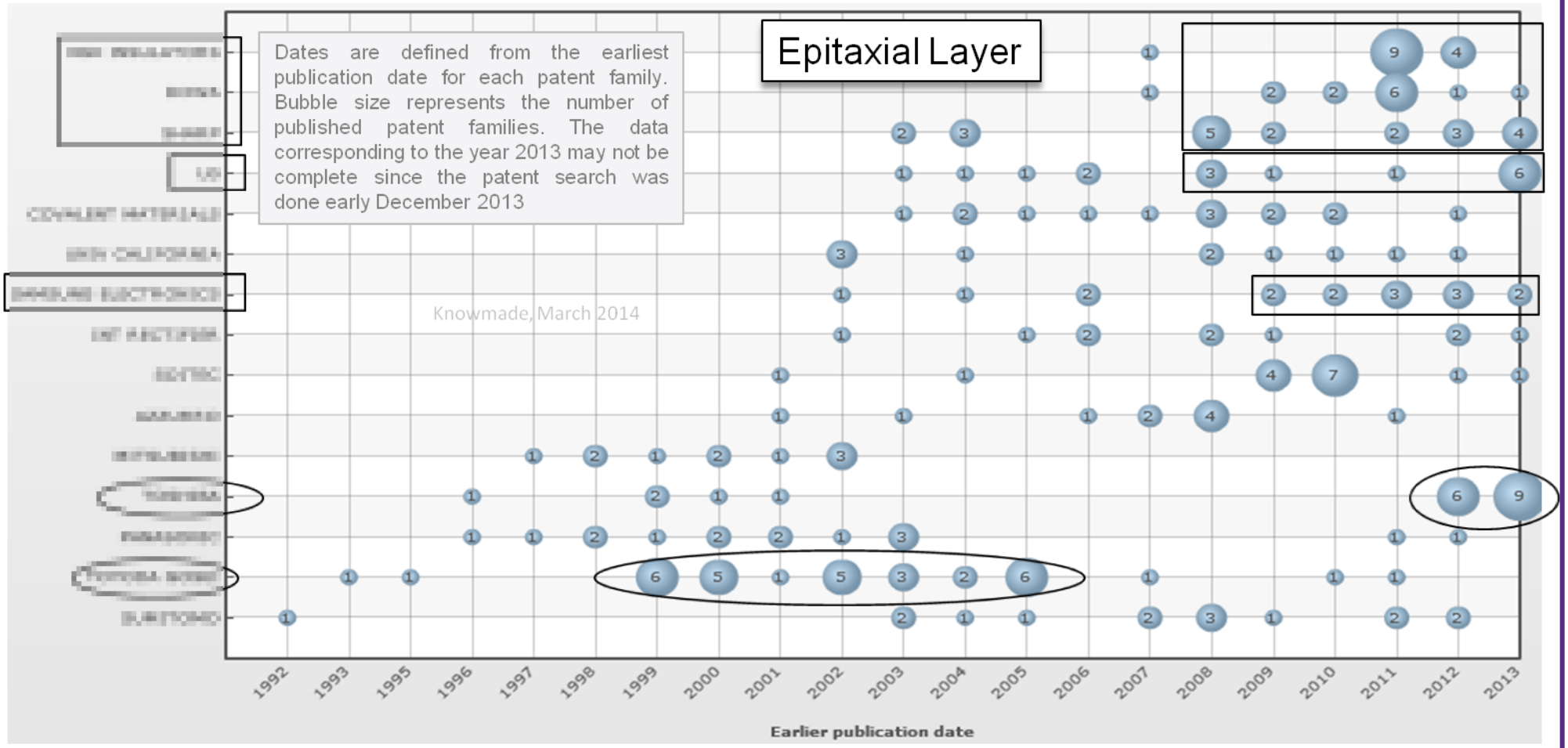


Note: The data corresponding to the year 2013 are not complete since the patent search was done in early December 2013.

• Early-1970s, IBM filed patents describing a GaN-based material grown on a silicon substrate entitled *"Method of fabricating nitrides of gallium and indium"* and *"Planar GaN Electroluminescent Device"* (DExxx and DExxx, not included in this report). Since then**,** at least **520 relevant patent families** describing the growth of GaN on Si have been published. The patents regarding the **layer transfer technology** of a thin GaN layer on a silicon host substrate appeared at the end-1990s, with at least **47 patent families** today.

• More than one third of patent families were published these last 3 years, and the number of new patent applications is increasing.

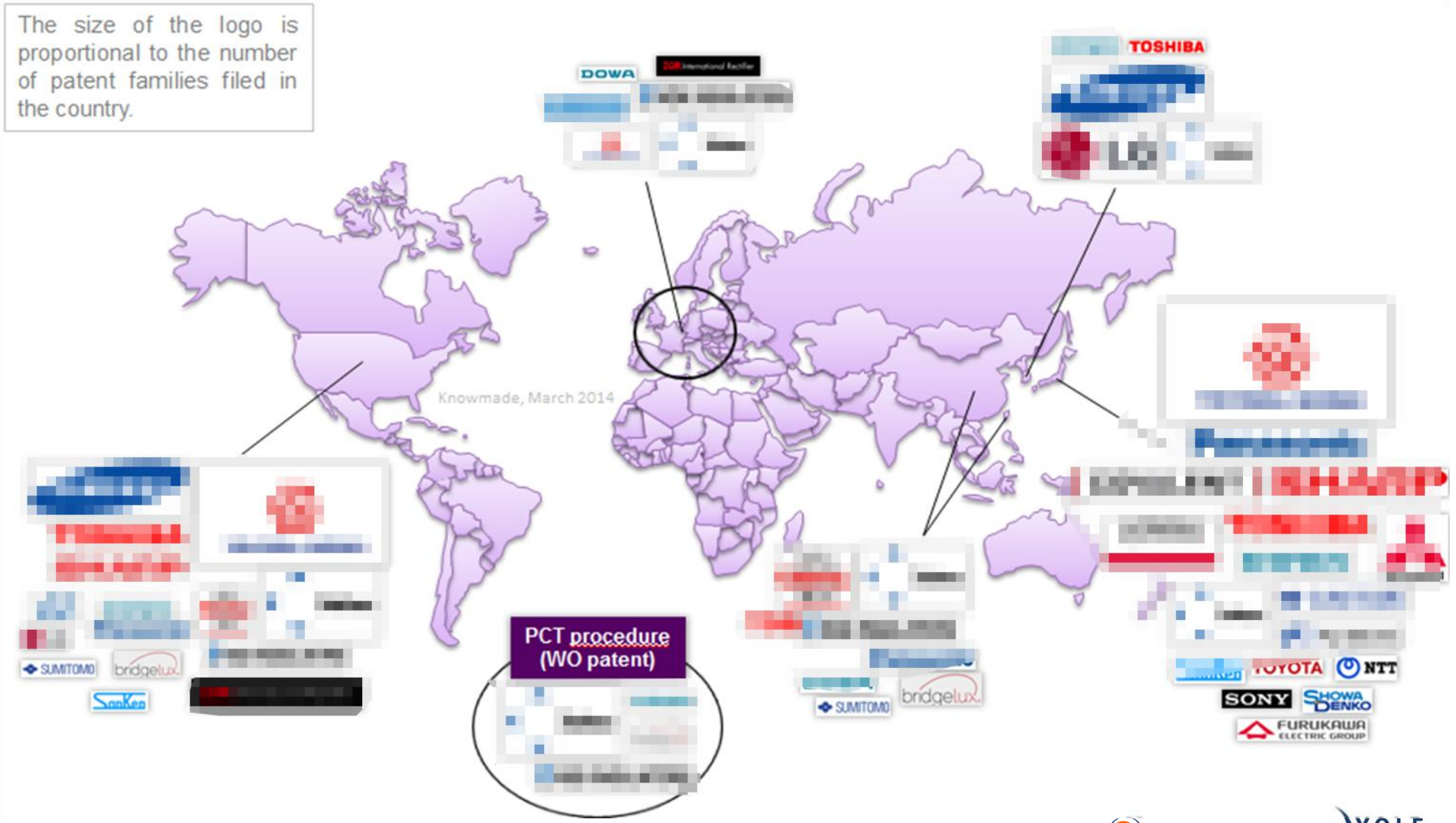
Time Evolution of Patent Applicants
Epitaxial Layer



• The patenting activity of **Company 1** was the most important between the end-1990s and mid-2000s, and it has been less active since 2006. Note the significant number of patent publications from **Company 2** these last 2 years, while **Company 3** has shown no patenting activity since 2003 (it focuses now on bulk GaN crystal).

• **Company 4**, **Company 5**, **Company 6**, **Company 7** and **Company 8** are becoming as major forces in the GaN-on-Si IP landscape.

Country of Filing for Patent Applicants
Epitaxial Layer

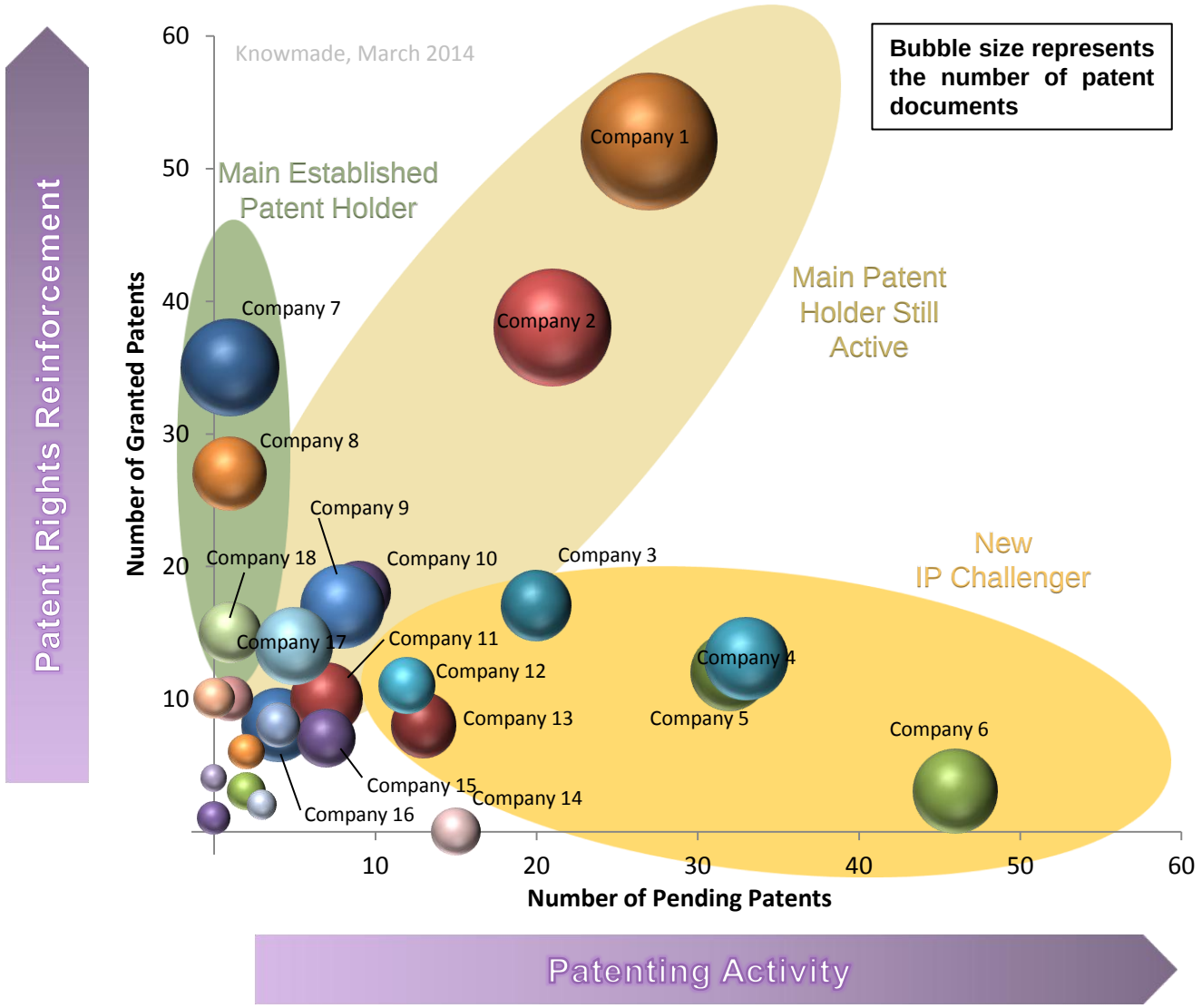


Summary of Applicant's Patent Portfolio
Epitaxial Layer

Patent Applicants	No. of patent families	Oldest priority date of the patent portfolio (YYYYMMDD)	No. of patent families filed / yr (average)	No. of patents documents	No. of patents / Patent family (average)	Patents average age (Y)	% granted	% pending	% dead revoked lapsed expired	No. of alive patents / family (granted, pending)	No. of granted patent by country				
											US	EP	JP	CN/TW/HK	KR
Company 1	XX	1991-12-18	1.5	71	2.2	11	49%	1%	49%	1.1	9	6	14	4	
Company 2	XX	2001-06-25	1.7	31	1.5	5	26%	42%	32%	1.0	2		4	2	
Company 3	XX	1995-03-20	1.1	45	2.3	4	27%	71%	2%	2.2	2	1	8		1
Company 4	XX	2002-01-14	1.3	30	1.9	4	60%	30%	10%	1.7	3	1	2	3	8
Company 5	XX	1997-08-20	1.0	37	2.3	4	46%	54%	0%	2.3	9		2		6
Company 6	XX	2000-06-09	1.1	140	9.3	4	37%	19%	44%	5.3	16	17	3	7	5
Company 7	XX	1994-08-12	0.8	40	2.7	12	20%	10%	70%	0.8	5			3	
Company 8	XX	1990-07-13	0.6	38	2.5	7	26%	18%	55%	1.1	4	1	2	1	1
Company 9	XX	2005-08-26	1.6	53	3.8	3	6%	87%	8%	3.5	3				
Company 10	XX	2001-09-06	1.1	25	1.8	6	28%	28%	44%	1.0	1		5	1	
Company 11	XX	2005-08-26	1.5	51	3.9	3	25%	65%	10%	3.5	2		7	2	2
Company 12	XX	1995-12-11	0.6	41	4.1	14	66%	2%	32%	2.8	4	6	11		2
Company 13	XX	2000-12-14	0.8	52	5.2	5	33%	15%	52%	2.5	10	4		1	
Company 14	XX	2000-11-09	0.8	102	10.2	7	37%	21%	42%	5.9	1	25	1	5	
Company 15	XX	1998-03-26	0.6	10	1.1	10	30%	20%	50%	0.6	1		2		
Company 16	XX	1996-06-04	0.5	8	1.0	13	13%	0%	88%	0.1			1		
Company 17	XX	2008-05-27	1.4	23	2.9	2	48%	52%	0%	2.9	6			5	
Company 18	XX	1997-04-16	0.4	9	1.5	9	67%	22%	11%	1.3	1		5		
Company 19	XX	2003-11-21	0.6	14	2.3	6	57%	29%	14%	2.0	2		5	1	
Company 20	XX	1998-02-25	0.4	15	2.5	13	67%	7%	27%	1.8	1	3	2	3	1
Company 21	XX	2001-02-14	0.5	28	4.7	9	54%	4%	43%	2.7	3	2	7	1	
Company 22	XX	1998-08-06	0.3	5	1.0	12	80%	0%	20%	0.8			4		
Company 23	XX	2000-12-14	0.4	45	9.0	8	31%	11%	58%	3.8	7	4		1	
Company 24	XX	2001-06-20	0.4	12	2.4	8	83%	0%	17%	2.0	2		3	1	4
Company 25	XX	2004-06-14	0.5	6	1.2	5	33%	50%	17%	1.0			2		
Company 26	XX	2007-09-27	0.8	17	3.4	1	0%	88%	12%	3.0					

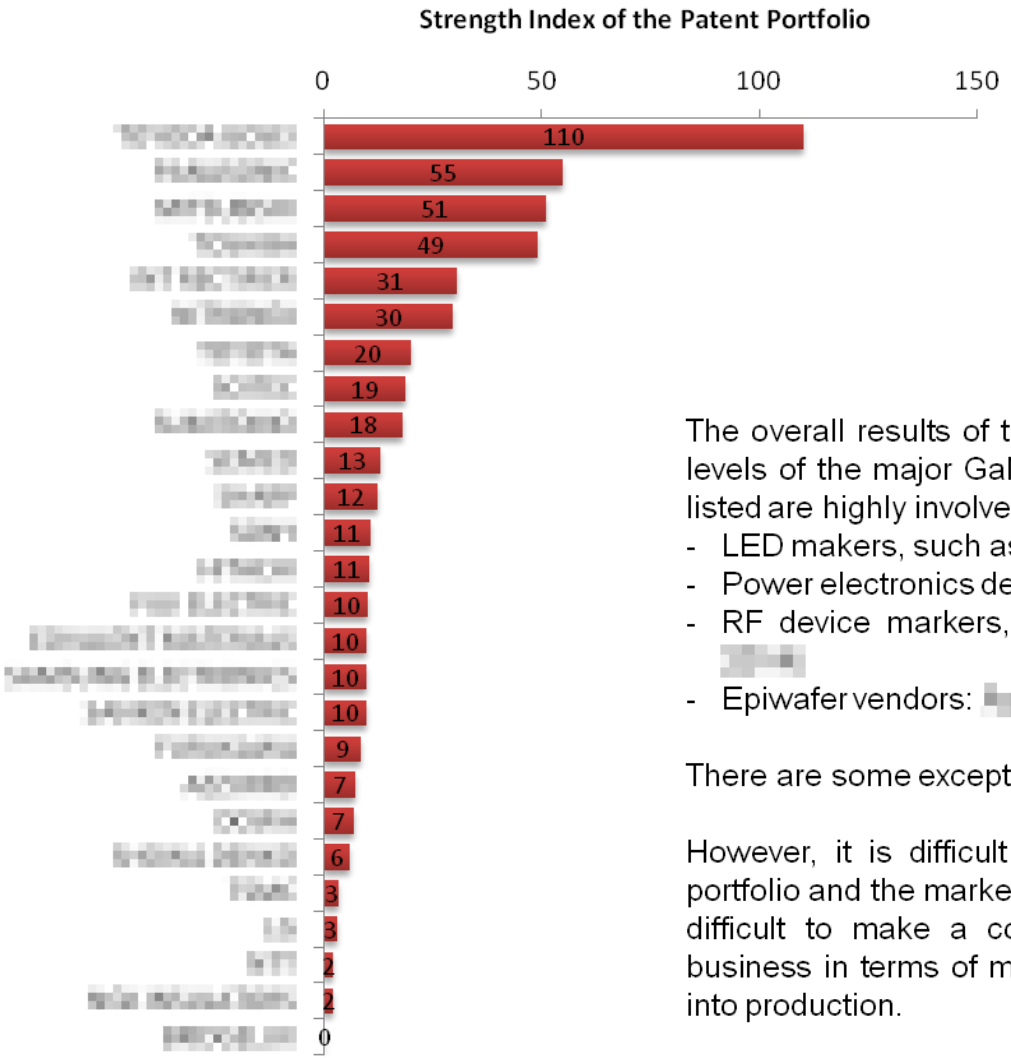
: highest value in column
: lowest value in column

Leadership of Patent Applicants
Epitaxial Layer



- **Company 1** and **Company 2** hold the highest number of granted patents (xx and xx patents respectively) related to epitaxial layers. **Company1**'s patents are in force mainly in Europe and USA and **Company2**'s granted patents concern European countries.
- **Company 6**, **Company 5**, **Company 4** and **Company 3** are becoming as major forces in the IP landscape. Note that **Company 4**, **Company 6** and **Company 5** have adopted a world wide IP strategy, while **Company 3** seems to focus on USA and Korea.

Impact Factor of Patent Portfolios
Epitaxial Layer



Portfolio Strength Index = [*No. of patent families*] X [*citation ratio of patent families* / *citation ratio over all GaN-on-Si patent families*]

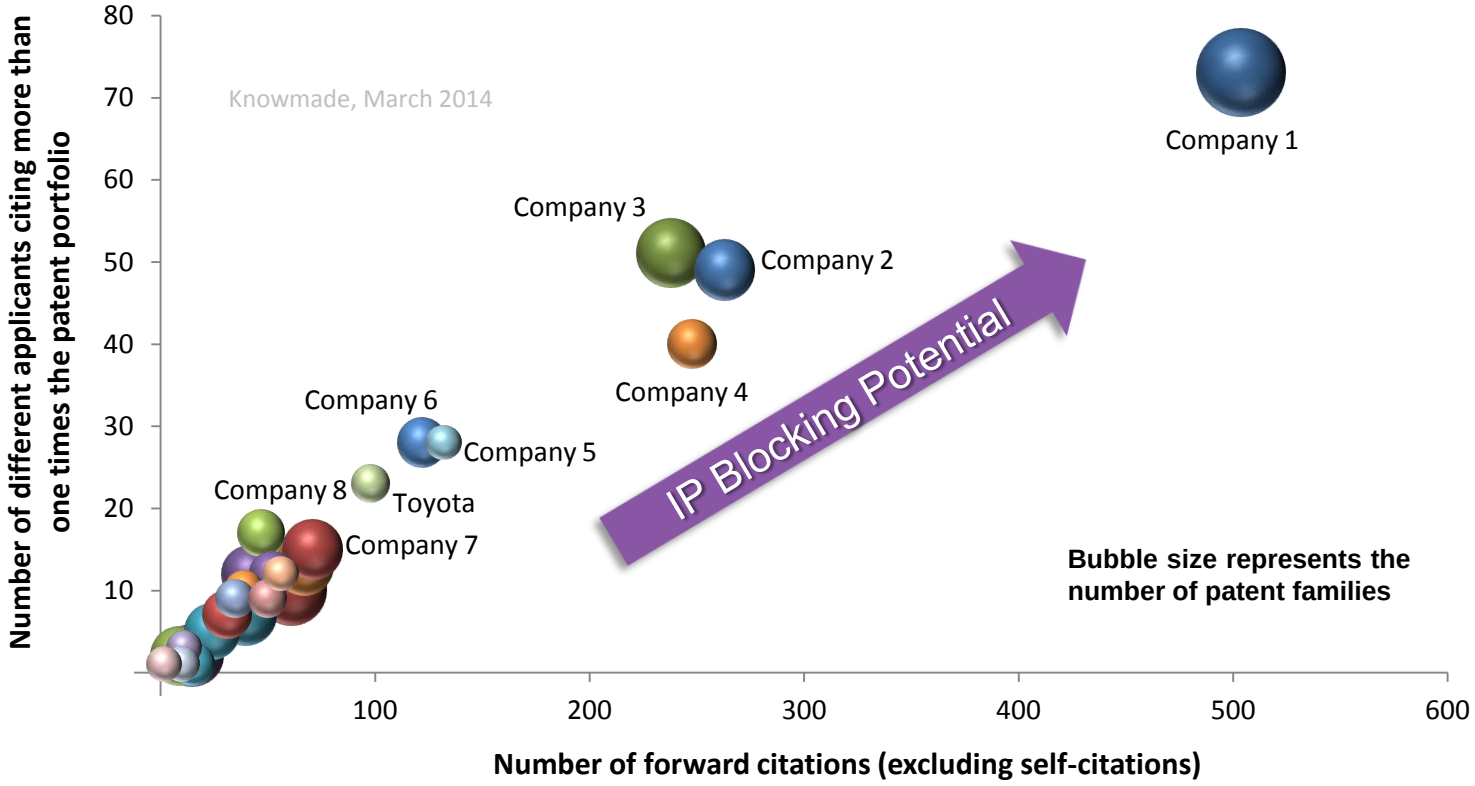
The overall results of this analysis conforms to the perceived positions and activity levels of the major GaN-on-Si players. Among the top assignees, most companies listed are highly involved in GaN-on-Si business in one way or the other:

- LED makers, such as
- Power electronics device makers, such as
- RF device markers, such as
- Epiwafer vendors:

There are some exception, such as

However, it is difficult to make a correlation between IP strength of the patent portfolio and the market position. GaN-on-Si market is still at its early stage, and it is difficult to make a concrete ranking of the companies involved in GaN-on-Si business in terms of market volume, as most of them just began or about to enter into production.

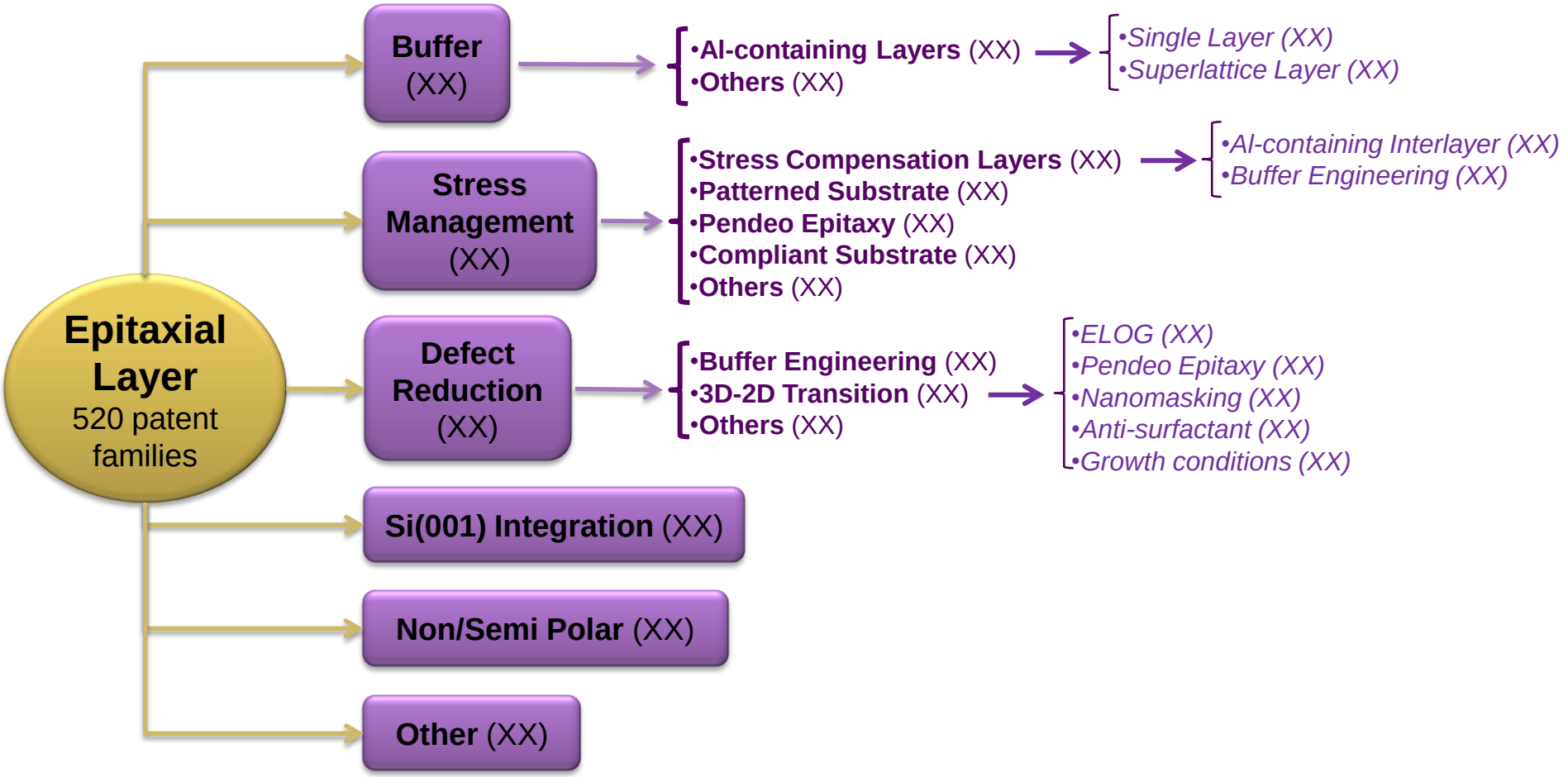
Blocking Potential of Applicant Portfolio
Epitaxial Layer



- The more the number of forward citations from different patent applicants is high, the more the capacity to hamper the other firms' attempts to patent a related invention is important.
- **Company 1, Company 2, Company 3** and **Company 4** have a significant **IP blocking potential**. Their patent families selected for this study received a lot of forward citations from an important number of different patent applicants. **Company 5** has also a noticeable IP blocking potential thanks to fundamental patents on compositionally graded AlGaN buffer.
- Note, however, that **the identification of a "blocking patent" requires an in-depth specific analysis of each patent documents**.

Technology Breakdown of Patent Filings

Patents belonging to the group **Epitaxial Layer** have been manually categorized by technological issue. In brackets is the corresponding number of patent families. Note that a patent can be found in several categories.



Matrix Applicants / Technology Issues

INDUSTRIAL APPLICANTS	Number of Patent Families	TECHNOLOGICAL SEGMENTS												
		Buffer		Defect Reduction			Stress Management					Non/Semi Polar	Si(001) Integration	Other
		Al-containing Layers	Others	Buffer Engineering	3D-2D Transition	Others	Stress Compensation Layers	Patterned Substrate	Pendeo Epitaxy	Compliant Substrate	Others			
Company 1	XX	13	2		17		4	5	4		1			
Company 2	XX	9	3	4	4	2	10	1	1	1			1	2
Company 3	XX	11	5	3	2	1	14							
Company 4	XX	8	4	2	2	1	9			2				1
Company 5	XX	5	1	3	6	1	5	1	2		1		1	
Company 6	XX	2	1		8		4	2		3				1
Company 7	XX	1	4	2	5	3	2		3	2	1			1
Company 8	XX	2			8		1	2			1			2
Company 9	XX	13	1	1	2		10							
Company 10	XX	4	6	4			2					3		1
Company 11	XX	8	2	2	1		7				2			
Company 12	XX		2	1	8		1							
Company 13	XX	3	2		2		6	1		1			1	
Company 14	XX	2			4		5	1				1	2	
Company 15	XX	3	2	2	3	1								
Company 16	XX	2	1		2		1	2			2			
Company 17	XX	2			3		2	3					1	
Company 18	XX	1	2	1	1		2							1
Company 19	XX	3			1		3				1			1
Company 20	XX		3		3		1							
Company 21	XX	1						3	1					
Company 22	XX		4	3									1	
Company 23	XX	2	2		2		3			1				
Company 24	XX	2		3	1		2							
Company 25	XX	2	2	2			2							
Company 26	XX	2	2	1	1		1	1						

Source: Knowmade, March 2014

Granted Patents Near Expiration

BUFFER

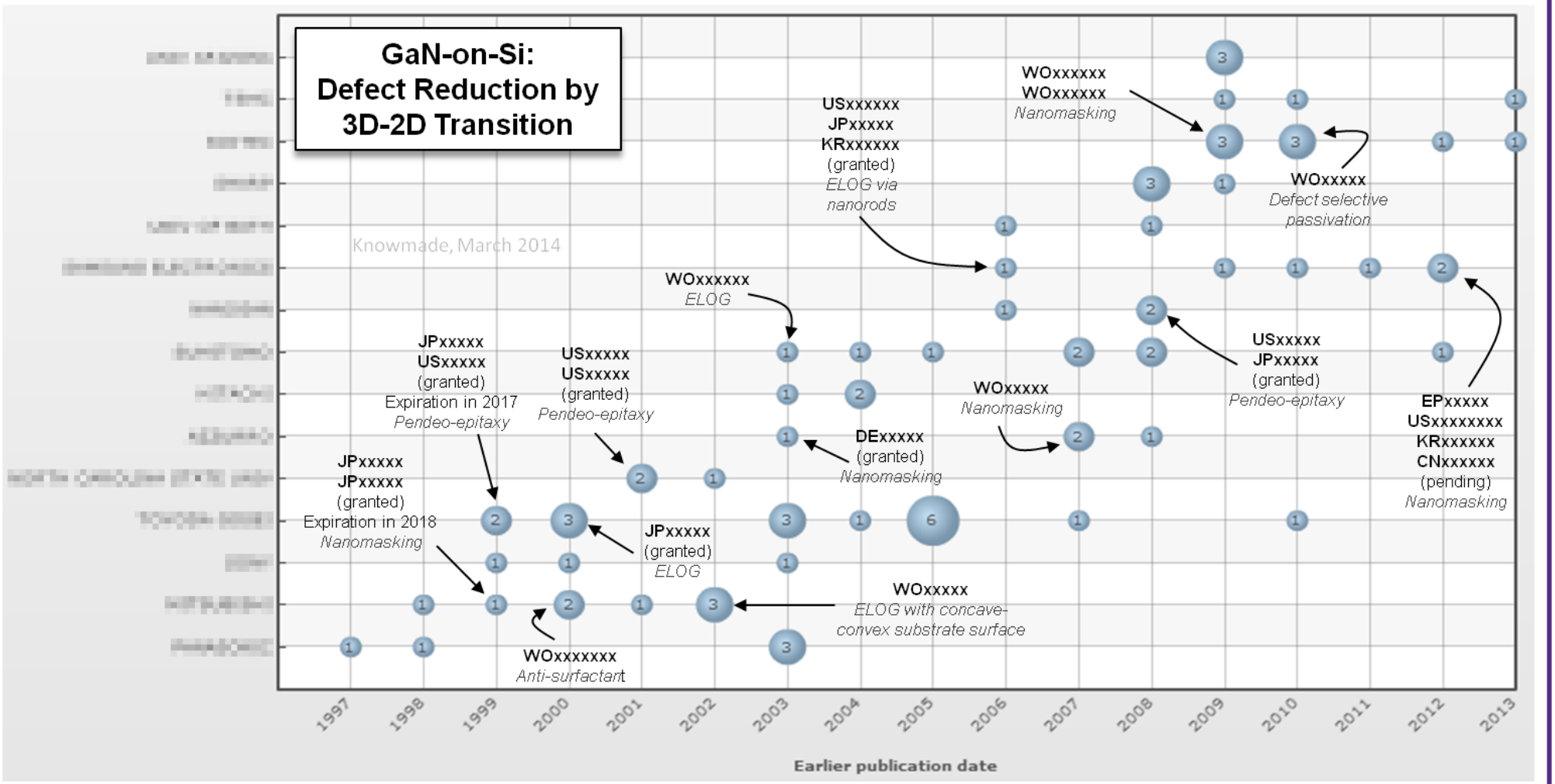
Title	Publication Number	Patent Assignee(s)	Application Date	Expected Expiration Date *
Production of a planar tear-free light emitter …	DExxxxxx (Utility Model)	Company 1	AAAA-MM-DD	2015-11-10
Heteroepitaxial semiconductor …	USxxxxxx	Company 2	AAAA-MM-DD	2016-07-16
Crystal growth method …	JPxxxxxx	Company 3	AAAA-MM-DD	2017-07-03
Gallium nitride semiconductor …	JPxxxxxx	Company 4	AAAA-MM-DD	2017-07-16
Manufacture of III nitride compound …	JPxxxxxx	Company 5	AAAA-MM-DD	2017-07-23
Method of fabricating single crystalline of gallium-nitride …	KRxxxxxx	Company 6	AAAA-MM-DD	2017-08-20
Gallium nitride semiconductor …	JPxxxxxx	Company 7	AAAA-MM-DD	2017-11-05
Substrate for electronic …	JPxxxxxx USxxxxxx	Company 8	AAAA-MM-DD	2018-06-01 2018-06-23
Compound semiconductor element …	JPxxxxxx	Company 9	AAAA-MM-DD	2018-08-06

** 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.*

KnowMade YOLE Développement

Time Evolution of Patent Applicants
3D-2D Transition

DEFECT REDUCTION



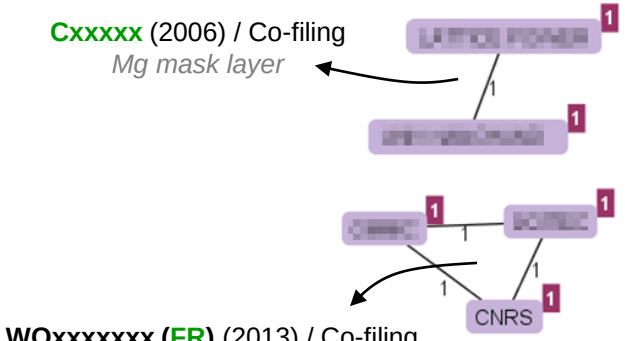
Dates are defined from the earliest publication date for each patent family. Bubble size represents the number of published patent families. The data corresponding to the year 2013 may not be complete since the patent search was done early December 2013.

KnowMade YOLE Développement

Patent Applicant IP Network
Nanomasking

DEFECT REDUCTION

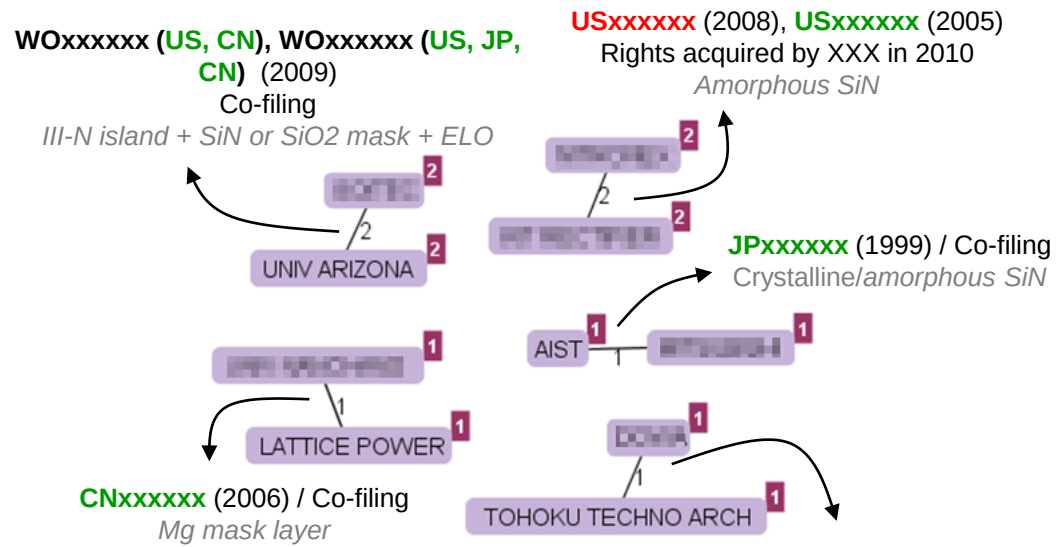
GaN-on-Si: Nanomask Interlayer



Cxxxxx (2006) / Co-filing
Mg mask layer

WOxxxxxxx (FR) (2013) / Co-filing
In-situ SiN mask layer

GaN-on-Si: Nanomask on Substrate



WOxxxxxx (US, CN), WOxxxxxx (US, JP, CN) (2009)
Co-filing
III-N island + SiN or SiO2 mask + ELO

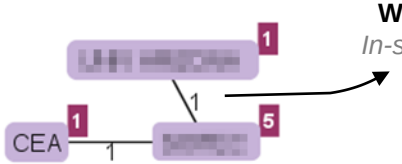
USxxxxxx (2008), **USxxxxxx** (2005)
Rights acquired by XXX in 2010
Amorphous SiN

JPxxxxxx (1999) / Co-filing
Crystalline/*amorphous SiN*

CNxxxxxx (2006) / Co-filing
Mg mask layer

JPxxxxxx (2009) / Co-filing
Triangular-pyramid-shaped or triangular-trapezoid-shaped metal nitride microcrystals (CrN, ZrN …)

GaN-on-Si: Defect Selective Passivation



WOxxxxxx (US) (2009) / Co-filing
In-situ amorphous material + thermal process

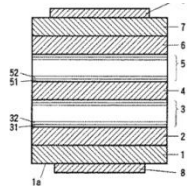
WOxxxxxx (2010) / Co-filing
In-situ elargement of emergent surface dislocations + mask layer for forming a plurality of dislocation pit plugs

•Number in black on each link between applicants is the number of co-assigned patent families. Number up right to each box is the number of patent families for this applicant in the data set taken into account for the technology segment.
•For each link it is provided the patent number, the publication date, the collaboration type (co-filing or right acquisition) and the subject matter of the patented invention.
•The color of the patent number is related to its current legal status (green: granted, blue: pre-grant stage, red: dead)

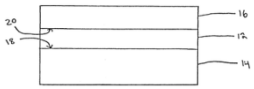
Key Patents
Stress compensation layers

STRESS MANAGEMENT

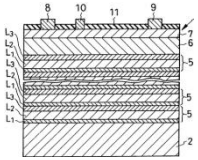
The selection of key patent families is based on the family size, current legal status of patents, citations analysis and impact on the technological segment.



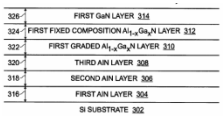
Company A
JPxxxxxx
Buffer engineering
(1999)



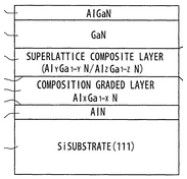
Company B
USxxxxxx
Buffer engineering
(2002)



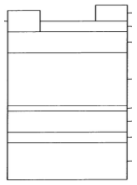
Company D
USxxxxxx
Buffer engineering
(2005)



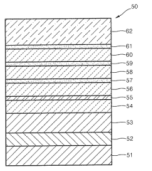
Company F
USxxxxxx
Buffer engineering
(2009)



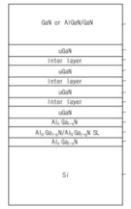
Company H
WOxxxxxx
Buffer engineering
(2009)



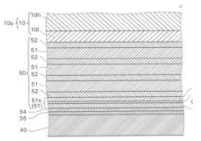
Company I
WOxxxxxx
Buffer engineering
(2009)



Company N
EPxxxxxx
Al-containing interlayer
(2012)



Company O
KRxxxxxx
Al-containing interlayer
(2013)



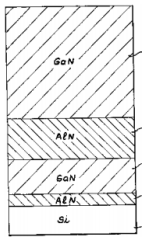
Company P
JPxxxxxx
KRxxxxxx
JPxxxxxx
JPxxxxxx
JPxxxxxx
Buffer engineering
(2012-2013)

Earliest publication date of the patent family

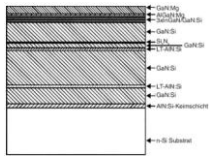
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013

Knowmade, March 2014

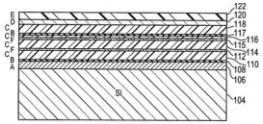
Company C
WOxxxxxx
Al-containing interlayer
(2001)



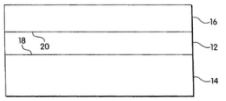
Company E
DExxxxxx
Al-containing interlayer
(2003)



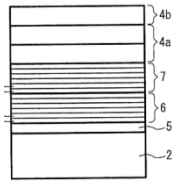
Company G
WOxxxxxx
WOxxxxxx
Al-containing interlayer
(2007-2008)



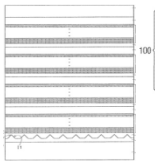
Company J
USxxxxxx
Buffer engineering
(2009)



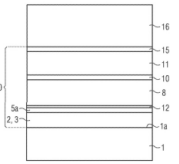
Company K
WOxxxxxx
JPxxxxxx
Buffer engineering
(2011)



Company L
USxxxxxx
USxxxxxx
Buffer engineering
(2011)



Company M
WOxxxxxx
Al-containing interlayer
(2011)



KnowMade YOLE Développement

Samsung Electronics

Patenting activity

- Patent holder active since mid-2000s with a significant increase of patent filings since 2009.
- [redacted] Patents within [redacted] Patent Families
- Oldest priority date: [redacted]
- Patent average age: 4
- Main country of patent filings: KR, US
- [redacted] granted patents (main country: [redacted])
- [redacted] pending patents

Technological Issues

- **Defect Reduction**: 3D-2D transition (nanomask interlayer)
- **Stress Management**: [redacted]

➔ [redacted]

Impact of Patent Portfolio

- Low IP Blocking Potential for prior art ([redacted])
- High IP Enforcement Potential ([redacted])

IP Collaborations

- **SEMCO (Samsung Electro-Mechanics)**
  - AlN buffer: US[redacted] (2006, Rights acquired by Samsung Electronics in 2010, Granted)
  - Nanorods and amorphous matrix layer filling spaces: US[redacted] (2006, Rights acquired by Samsung Electronics in 2010, Granted)
- **Sungkyunkwan University**
  - [redacted]: KR[redacted] (2009, Co-filing, Granted)

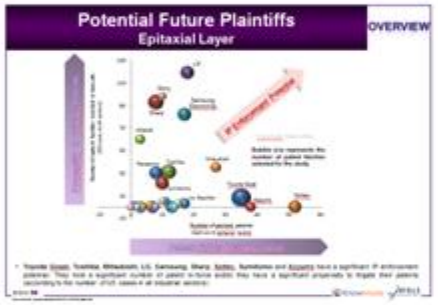
Key Patent Families

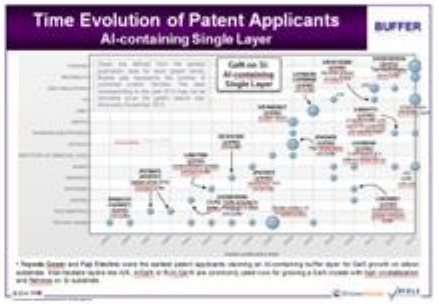
- EP[redacted] (2012, Defect reduction by [redacted], Stress management by [redacted])
- US[redacted] (2011, Stress management by [redacted])
- US[redacted] (2006, Defect reduction by [redacted])

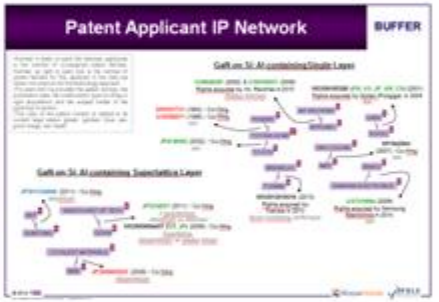
Granted Patents Near Expiration Date

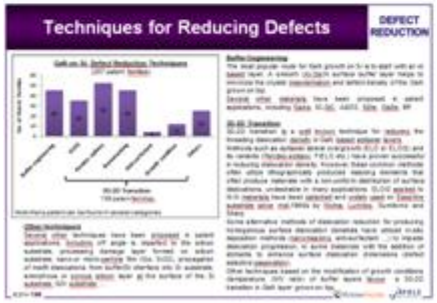
- **Defect reduction**: KR[redacted] (exp. date 2017-08-20)

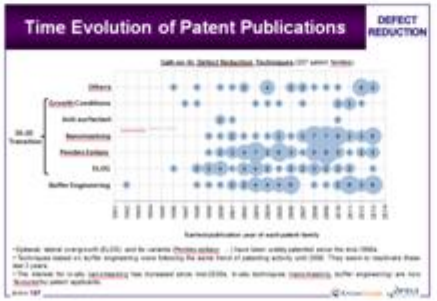
Other Sample Pages

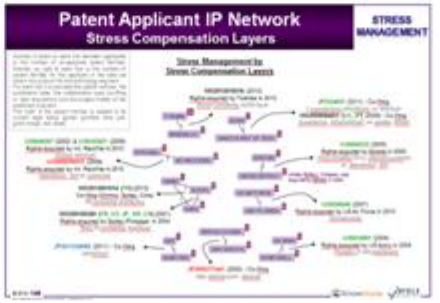


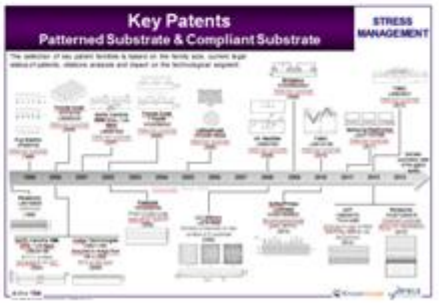












Excel Database

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, technological segments, legal status for each member of the patent family.

Drawing	Title	Abstract	Inventor(s)	Assignee(s)	Claims	Hyperlink	Patent Type: Epitaxial Layer	Patent Type: Layer Transfer	Patent Type: Key Patent	Buffer	Al-containing Layers	Al-containing Layers: Single La	Al-containing Layers: Superlattice Lay	Others	Defect Reduction	Buffer Engineering	3D-2D Transition	ELOG	Pendeo Epi	Nanomarking	Nanomark Interl	Nano Sub
	Method for manufacturing semiconductor material	(CN102881570) The invention discloses a method for manufacturing a semiconductor material, which comprises the steps as follows: A) selecting an initial substrate; placing the initial substrate in an inner cavity of a metal	ZHU TINGGANG	JIANGSU NENGHUA MICROELECTRONIC TECHNOLOGY DEVELOPMENT	(CN102881570) (Claims machine translated from Chinese) 1. The preparation method of 1.1 semiconducting material, its characteristic lies in: Method that stated including the following	Open	x								x		x			x	x	
	III NITRIDE EPITAXIAL SUBSTRATE AND METHOD FOR MANUFACTURING SAME	(WO2013088461) Provided are: a III nitride epitaxial substrate wherein generation of crack is suppressed in a step of forming a device using the substrate; and a method for manufacturing the III nitride epitaxial	IKUTA TETSUYA; SHIBATA TOMOHIKO	DOWA ELECTRONICS MATERIALS	(WO2013088461) (Claims machine translated from Japanese) 1. Early layer and the said first stage which touch with the Si baseplate and the said Si baseplate it is formed an layer, the super	Open	x			x	x		x										
	METHOD FOR MANUFACTURING A THICK EPITAXIAL LAYER OF GALLIUM NITRIDE ON A SILICON OR SIMILAR SUBSTRATE AND LAYER OBTAINED USING SAID METHOD	(WO2013011014) The invention relates to a method for manufacturing, by means of epitaxy, a monocrystalline layer (3; 3', 3") of GaN on a substrate (1) wherein the coefficient of thermal	SCHENK DAVID; BAYARD ALEXIS; CORDIER YVON; FRAYSSINET ERIC; KENNARD MARK; RONDI DANIEL	CNRS - CENTRE NATIONAL RECHERCHE SCIENTIFIQUE; OMMIC; SOITEC; SOITEC SILICON ON INSULATOR	(WO2013011014) CLAIMS 1. Method for manufacturing, by means of epitaxy, a monocrystalline useful layer (3; 3', 3") of GaN on a	Open	x								x		x			x	x	
	Method for Reducing Stress in Epitaxial Grouth	(US20120319160) A device and method for making the same are disclosed. The device includes a substrate having a first TEC, a stress relief layer overlying the substrate, and crystalline cap layer.	LESTER STEVEN D	TOSHIBA TECHNO CENTER	(US20120319160) What is claimed is: 1. A device comprising: a substrate having a first TEC; a stress relief layer overlying said substrate;	Open	x			x				x									
	Silicon graphic substrate for grouth of GaN-based	(CN102810612) The invention discloses a	LI SHUTI; YI HANXIANG;	SOUTH CHINA NORMAL UNIVERSITY	(CN102810612)	Open																

Order Form

GaN-on-Si Patent Investigation (04-2014)

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

☐ **Multi user license: Euro 5990**

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 .

Signature:

I hereby accept Knowmade's Terms and Conditions of Sale

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.

Terms and Conditions of Sales

6. Protection of the Seller's IPR

6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.

6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

- Information storage and retrieval systems;
- Recordings and re-transmittals over any network (including any local area network);
- use in any timesharing, service bureau, bulletin board or similar arrangement or public display;
- Posting any Product to any other online service (including bulletin boards or the Internet);
- Licensing, leasing, selling, offering for sale or assigning the Product.

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.

6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will be the recipient of each new report in PDF format. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company.

7. Termination

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

8. Miscellaneous

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party.

The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

9. Governing law and jurisdiction

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Grasse, which shall have exclusive jurisdiction upon such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.