Biodegradable packaging for liquids

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Objective

To create a Technology landscape report on "Biodegradable Packaging for Liquids"

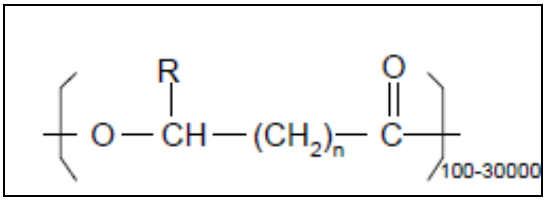
Comment: The idea is to find out the innovative market players in this technology area, those are the players that are the most technologically advanced in the market place. Intellectual Property that these players hold is taken as a measure of their technological prowess in this particular area. We have used Patents and Scientific articles to point out the innovative and technologically advanced market players.

Search methodology

Search strategy	1. Various class codes and keywords were retrieved for conducting the search related to Biodegradable Packaging from relevant patents, thesaurus and patent databases and scientific articles.
	2. The database used for patent search is Thomson innovation. (Refer section 6)
Keywords	biodegradable, bio-disintegratable, biopolymer, bioplastic,PLA, PHA, PHB, PHBV, etc.

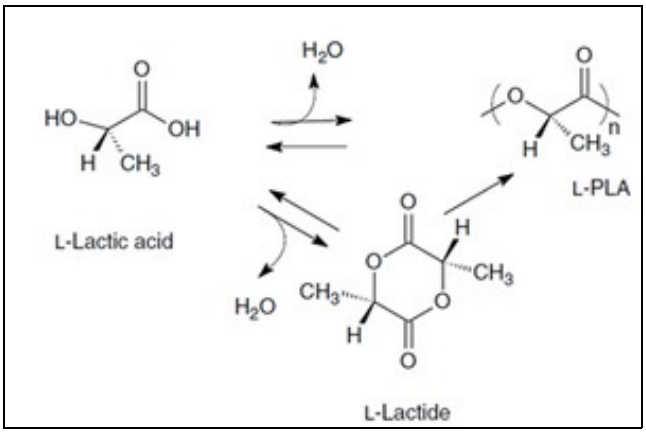
Background

The environmental and sustainability issues, the increasing cost of solid waste disposal, dioxin emission from waste incineration have made synthetic polymers unattractive. This has led to the development and production of biodegradable polymers. Polyhydroxyalkanoates (PHAs) are the intracellular inclusion in some bacteria. The property of PHA range from stiff, brittle to rubber-like and is a suitable alternative for the synthetic plastic.



The general structure of polyhydroxyalkanoates

- n=1 R=hydrogen poly(-3-hydroxypropionate)
- methyl poly(-3-hydroxybutyrate)
- ethyl poly(3-horoxyvalerate)
- propyl poly(-3-hydroxyhexanoate)
- pentyl poly (-3-hydroxyoctanoate)
- nonyl poly (-3-hydroxydodecanoate)
- n=2 R=hydrogen poly (-4-hydroxybutyrate)
- n=3 R=hydrogen poly (-5-hydroxyvalerate) (https://tspace.library.utoronto.ca/bitstream/1807/3487/1/jb04003.pdf.



Lactic acid polymerization to PLA

Polylactic acid (PLA) is another biopolymer with environmental benefit. Polylactic acid (PLA) is a rigid thermoplastic polymer and can be semicrystalline or amorphous. The backbone of PLA is L(_)-lactic acid (2-hydroxy propionic acid) which is a natural and most common form of the acid. D(_)-lactic acid can also be produced by microorganisms or through racemization. (http://www.jimluntllc.com/pdfs/polylactic_acid_technology.pdf)

Concept Table

English Keywords										French keywords
Concept 1	Concept 2	Concept 3	Concept 4	Concept 1	Concept 2	Concept 3	Concept 4	Concept 1	Concept 2	Concept 3
biodegradable	package	water vapor	barrier	biodégradables	forfait	la vapeur d?eau	barrière	biologisch abbaubar	Paket	Wasserdampf
biodegradation	packaging	Water vapour	resistant	biodégradation	emballage	La vapeur d?eau	résistants	Biodegradation	Verpackung	Wasserdampf
****	****	****	****	****	****	****	****	****	****	****

Search strategy

Patents

Thomson innovation

- **Time line: 1836 to September 21st, 2011**
- **Databases: US Grant, GB App, US App, FR App, WO App, DE Util, EP Grant, DE Grant, EP App, DE App, JP Util, JP Grant, JP App, CN Util, CN App, KR Util , KR Grant, KR App, DWPI**

S.No	Concept	Scope	Search string	No.of hits
	English keyword search			
1	Biodegradable KW	CTAB	(biodegrad*6 or bio-degrad*6 or ****	###
2	Biodegradable KW	Full text	(biodegrad*6 or bio-degrad*6 or ****	###
3	Packaging KW	CTAB	packag*3 or film*1 or ****	###
4	Biodegradable Packaging KW	CTAB	(biodegrad*6 or bio-degrad*6 or ****	###
5	Moisture resistance KW	Full text	((((water adj2 (vapor or vapour)) or****	###

6	Moisture resistant packaging	CTAB	(((((water adj2 (vapor or vapour)) or ****	###
7	Biodegradable and moisture resistant packaging KW	KW combination query	4 AND 6	###
8	ECLA class for bio or photo degradable packaging	Any IPC or ECLA	B65D006546C or ****	###
9	Biodegradable packaging US class	US class	220DIG30 or 383001	###
10	IPC or US class for biodegradable packaging	Combined query	8 or 9	###
11	Liquid packaging IPC?s	Any IPC or ECLA	B65D008572 or B65D008578 or ****	###
12	Liquid packaging IPC with biodegradable KW	Combined query	1 and 11	###
13	Layered product IPC	Any IPC or ECLA	B32B000502 or B32B000702 or ****	###
14	Stock material or misc. article US class	US class	428326 or 428058 or 428457 or ****	###
15	IPC or US class	Combined query	13 or 14	###
16	Biodegdradable macromolecular compd IPC	Any IPC or ECLA	C08L010116	###
17	Compositions of macromolecular compounds	Any IPC or ECLA	C08L000300 or C08L000302 or ****	###
18	Compositions of macromolecular compounds	US class	527207 or 527311 or ****	###
19	Pulp compositions IPC	Any IPC or ECLA	D21H002736 or D21H002730 or ****	###
20	US class for degradation	US class	523124 or ****	###
21	Processes for applying liquids to surfaces IPC	Any IPC or ECLA	B05D000300 or B05D000302 or****	###
22	Shaping and process related US class	US class	264129 or 264401 or ****	###
23	Any IPC or ECLA	Combined query	15 or 17 or 18 or 19 or 20 or 21 or 22	###
24	IPC or US Class and Biodeg pkg and moisture resistant KW	Combined query	23 and 4 and 5	###
25	Biodeg compd IPC and packaging and moisture resistant KW	Combined query	16 and 3 and 5	###
26	Biodeg pkg Class and moisture resistant KW	Combined query	10 and 5	###
27	Applications of disintegrable, dissolvable or edible materials	Any IPC or ECLA	B65D006546	###
28	Disintegrable IPC and Biodegradable and moisture resistance KW	Combined query	2 and 5 and 26	###
29	Final combined query in English		12 or 24 or 25 or 26 or 28	###
German keyword search				
1	Biodegradable KW	CTAB	((biologisch ADJ2 abbaubar) or biodégradation or ****	###
2	Biodegradable KW	Full text	((biologisch ADJ2 abbaubar) or biodégradation or ****	###
3	Packaging KW	CTAB	(Paket or Verpackung or Pakete or ****	###
4	Biodegradable Packaging KW	CTAB	((biologisch ADJ2 abbaubar) or biodégradation or ****	###
5	Moisture resistance KW	Full text	(Wasserdampf or Feuchtigkeit or ****	###
6	Moisture resistant packaging	CTAB	(Wasserdampf or Feuchtigkeit or ****	###
7	ECLA class for bio or photo degradable packaging	Any IPC or ECLA	B65D006546C	###
8	Liquid packaging IPC?s	Any IPC or ECLA	B65D008572 or B65D008578 or****	###
9	Liquid packaging IPC with biodegradable KW	Combined query	1 and 8	###
10	Layered product IPC	Any IPC or ECLA	B32B000502 or B32B000702 or ****	###
11	Biodegdradable macromolecular compd IPC	Any IPC or ECLA	C08L010116	###
12	Compositions of macromolecular compounds	Any IPC or ECLA	C08L000300 or C08L000302 or ****	###
13	Pulp compositions IPC	Any IPC or ECLA	D21H002736 or D21H002730 or ****	###

14	Processes for applying liquids to surfaces IPC	Any IPC or ECLA	B05D000300 or B05D000302 or ****	###
15	Any IPC or ECLA	Combined query	10 or 12 or 13 or 14	###
16	IPC or US Class and Biodeg pkg and moisture resistant KW	Combined query	15 and 4	###
17	Biodeg compd IPC and packaging and moisture resistant KW	Combined query	11 and 3 and 5	###
18	Biodeg pkg Class and moisture resistant KW	Combined query	8 and 5	###
19	Applications of disintegrable, dissolvable or edible materials	Any IPC or ECLA	B65D006546	###
20	Disintegrable IPC and Biodegradable and moisture resistance KW	Combined query	2 and 5 and 19	###
21	Final combined german query		9 or 16 or 17 or 18 or 20	###
French keyword search				
1	Biodegradable KW	CTAB	(biodegradables or biodegradation or ****	###
2	Biodegradable KW	Full text	(biodégradables or biodégradation or****	###
3	Packaging KW	CTAB	forfait or emballage or paquets or ****	###
4	Biodegradable Packaging KW	CTAB	(biodegradables or biodegradation or ****	###
5	Moisture resistance KW	Full text	(((la vapeur ADJ2 d?eau) or (La vapeur ADJ2 d?eau) or ****	###
6	Moisture resistant packaging	CTAB	(((la vapeur ADJ2 d?eau) or ****	###
7	Biodegradable and moisture resistant packaging KW	KW combination query	4 AND 6	###
8	ECLA class for bio or photo degradable packaging	Any IPC or ECLA	B65D006546C	###
9	Liquid packaging IPC?s	Any IPC or ECLA	B65D008572 or B65D008578 or****	###
10	Liquid packaging IPC with biodegradable KW	Combined query	1 and 9	###
11	Layered product IPC	Any IPC or ECLA	B32B000502 or B32B000702 or ****	###
12	Biodegdradable macromolecular compd IPC	Any IPC or ECLA	C08L010116	###
13	Compositions of macromolecular compounds	Any IPC or ECLA	C08L000300 or C08L000302 or ****	###
14	Pulp compositions IPC	Any IPC or ECLA	D21H002736 or D21H002730 or ****	###
15	Processes for applying liquids to surfaces IPC	Any IPC or ECLA	B05D000300 or B05D000302 or ****	###
16	Any IPC or ECLA	Combined query	11 or 13 or 14 or 15	###
17	IPC or US Class and Biodeg pkg and moisture resistant KW	Combined query	16 and 4 and 5	###
18	Biodeg compd IPC and packaging and moisture resistant KW	Combined query	12 and 3 and 5	###
19	Biodeg pkg Class and moisture resistant KW	Combined query	8 and 5	###
20	Applications of disintegrable, dissolvable or edible materials	Any IPC or ECLA	B65D006546	###
21	Disintegrable IPC and Biodegradable and moisture resistance KW	Combined query	2 and 5 and 20	###
22	Final combined french query		10 or 17 or 18 or 19 or 21	###
Japanese F Term search				
1	Biodegradable materials	JP F-terms	4J200BA* or ****	###
2	Packaging KW	CTAB	packag*3 or film*1 or ****	###
3	Moisture resistance KW	Full text	((((water adj2 (vapor or vapour)) or ****	###
4	Moisture resistant pkg KW with Biodegradability Fterms	Combined query	1 and 2 and 3	###
5	Liquid packaging	JP F-terms	3E035AA03 or ****	###

6	Biodegradability KW	CTAB	(biodegrad*6 or bio-degrad*6 or ****	###
7	Biodegradability KW with liquid packaging Fterms	Combined query	4 and 5	###
8	Moisture resistant packaging	JP F-terms	3E033CA09 or 3E060DA21 or ****	###
9	Biodegradability KW and Moisture resistant packaging F terms	Combined query	5 and 7	###
10	Final combined Japanese query		4 or 6 or 8	###
1	**Final combination of all languages search query**			###

Relevant Class Codes and Definitons

IPC/ECLA

Class Codes	Definitions
B65D	**Containers for storage or transport of articles or materials**
3/22	Rigid or semi-rigid containers having bodies or peripheral walls of curved or partially-curved cross-section made by winding or bending paper without folding along defined lines;Containers with double walls
85/72	Containers, packaging elements or packages, specially adapted for particular articles or materials;For edible or potable liquids, semiliquids or potable or plastic materials
****	****

US Class

Class codes	Definitions
220	Receptacle
DIG30	biodegradable
****	****

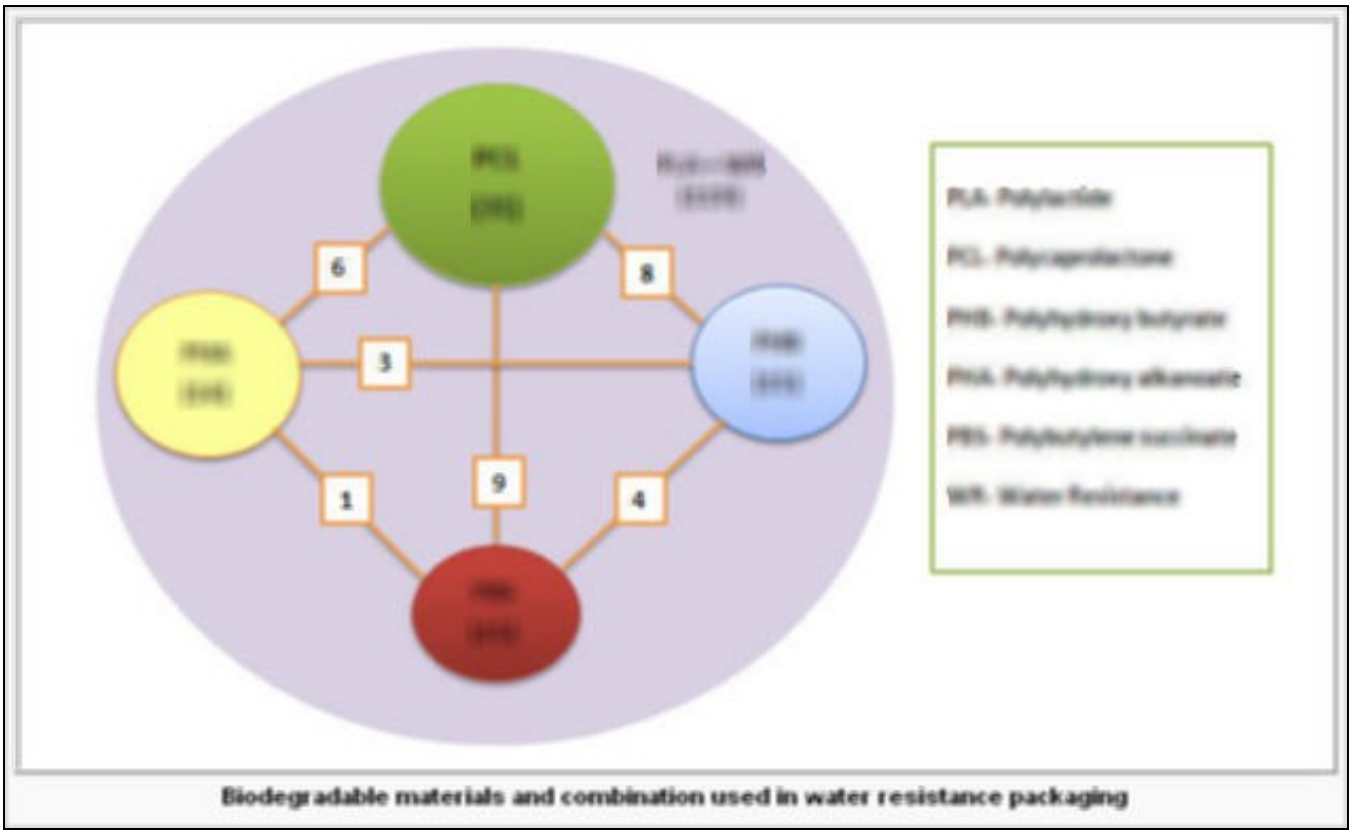
F Term

F- TERM	Description
4J200	Biological depolymerization polymers
4J200BA*	Biodegradable materialsa (all F terms under this is included)
****	****

Relevant Patents

S. No.	Patent / Publication No.	Title	Assignee	Publication year	Dolcera summary
1	US7951438	BIAXIALLY ORIENTED POLYLACTIC ACID FILM WITH HIGH BARRIER	TORAY PLASTICS AMERICA INC	2011	A metallized laminate of polylactic acid with a moisture barrier property of at least 1.0 g/m^2/day or better at 38^{o}C. and 90% RH
2	US20110076511	MULTI-LAYER HIGH MOISTURE BARRIER POLYLACTIC ACID FILM	TORAY PLASTICS AMERICA INC	2011	A multi-layer biaxially oriented polylactic acid film with a coating layer of aluminum for improvement in barrier properties.
3	****	****	****	****	****

Trends and Insights



Biodegradable materials and combination used in water resistance packaging

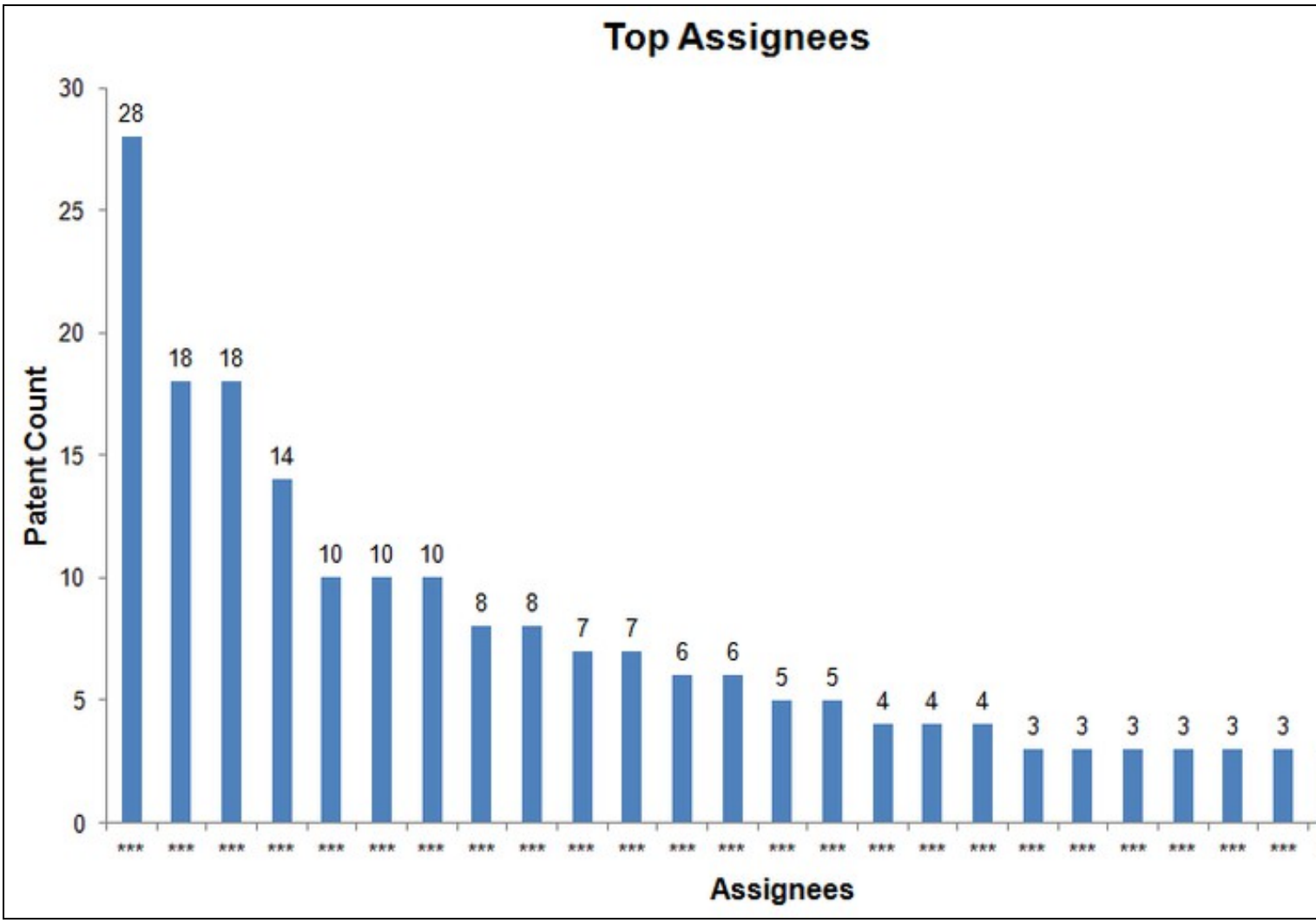
- Numerical values represent the patent count
- Circles represents different compositions
- Lines between two circles is the patent count of biodegradable materials used in combination

Sample Analysis Sheet

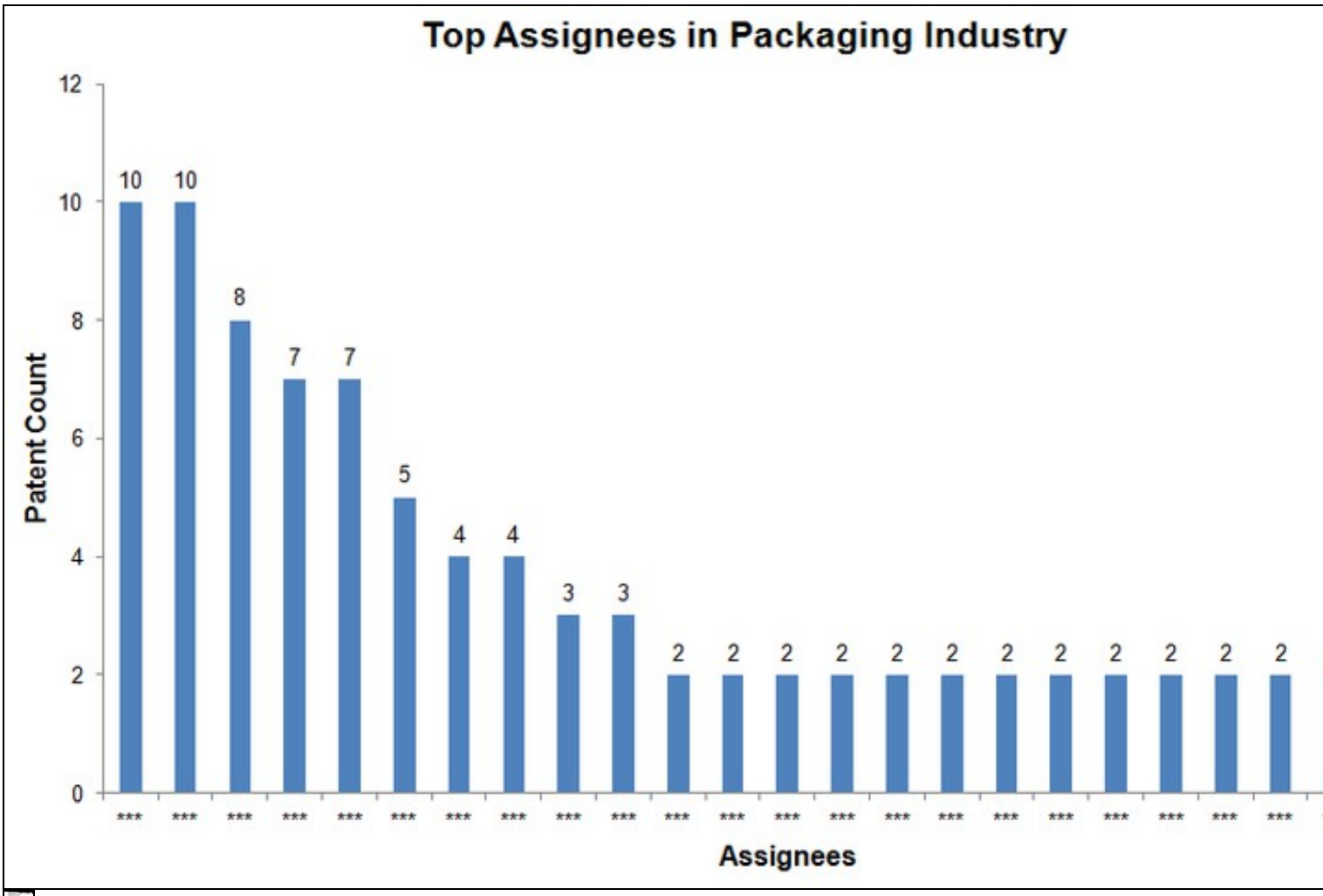
Market Research Information

For market information on Biodegradable packaging for liquids, please click here

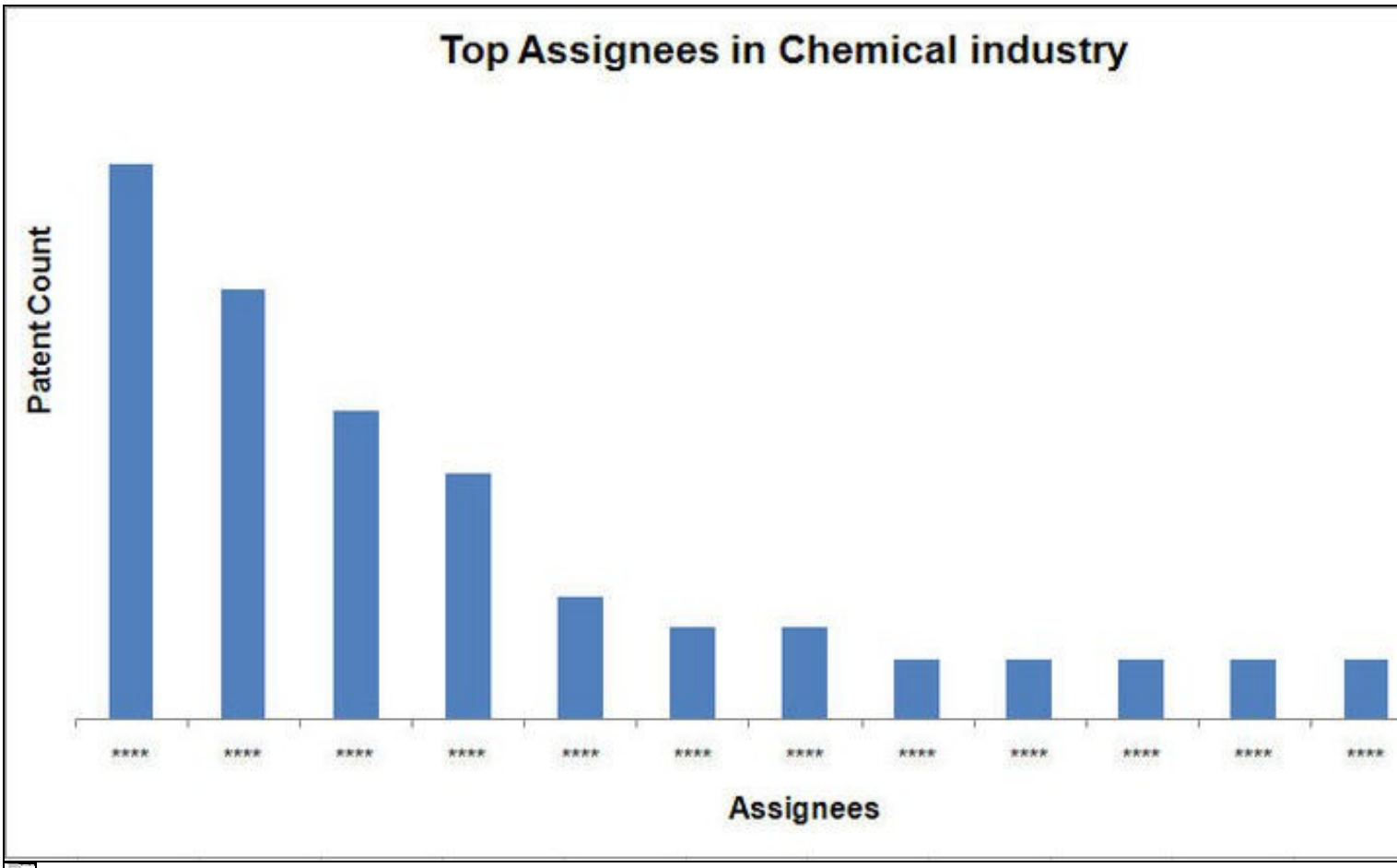
Assignee analysis and IP activity



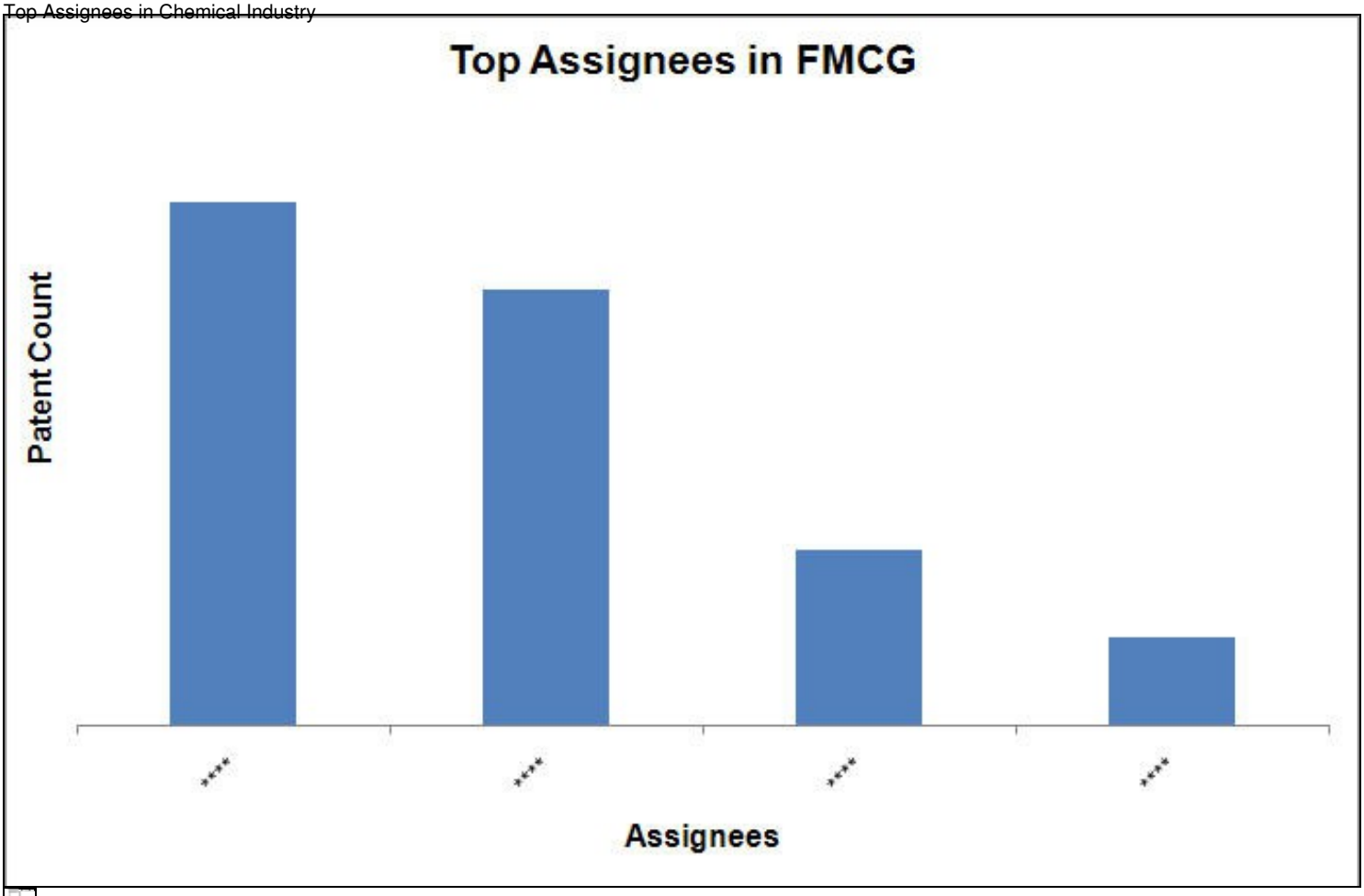
Top Assignees in this technology area



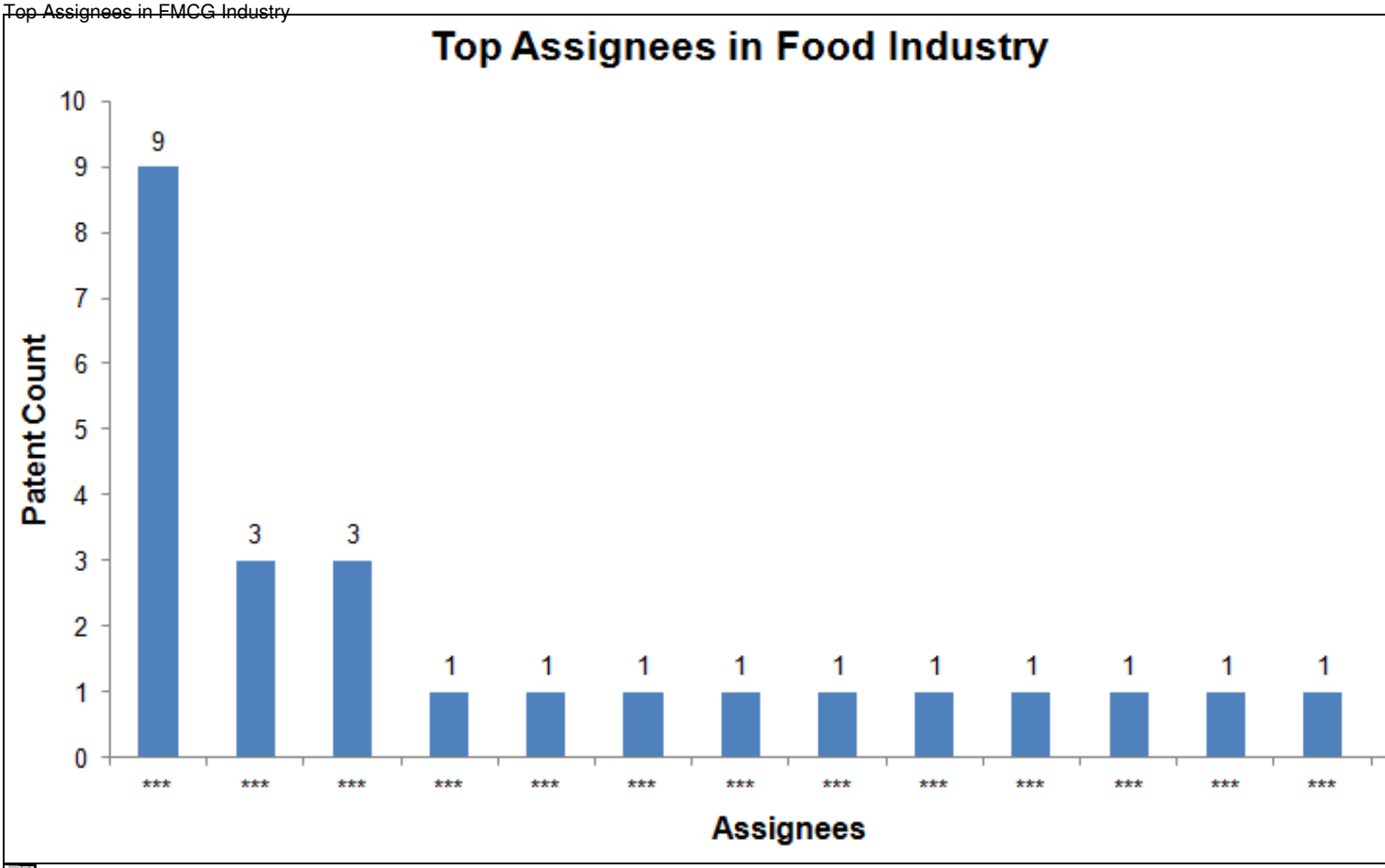
Top Assignees in Packaging Industry



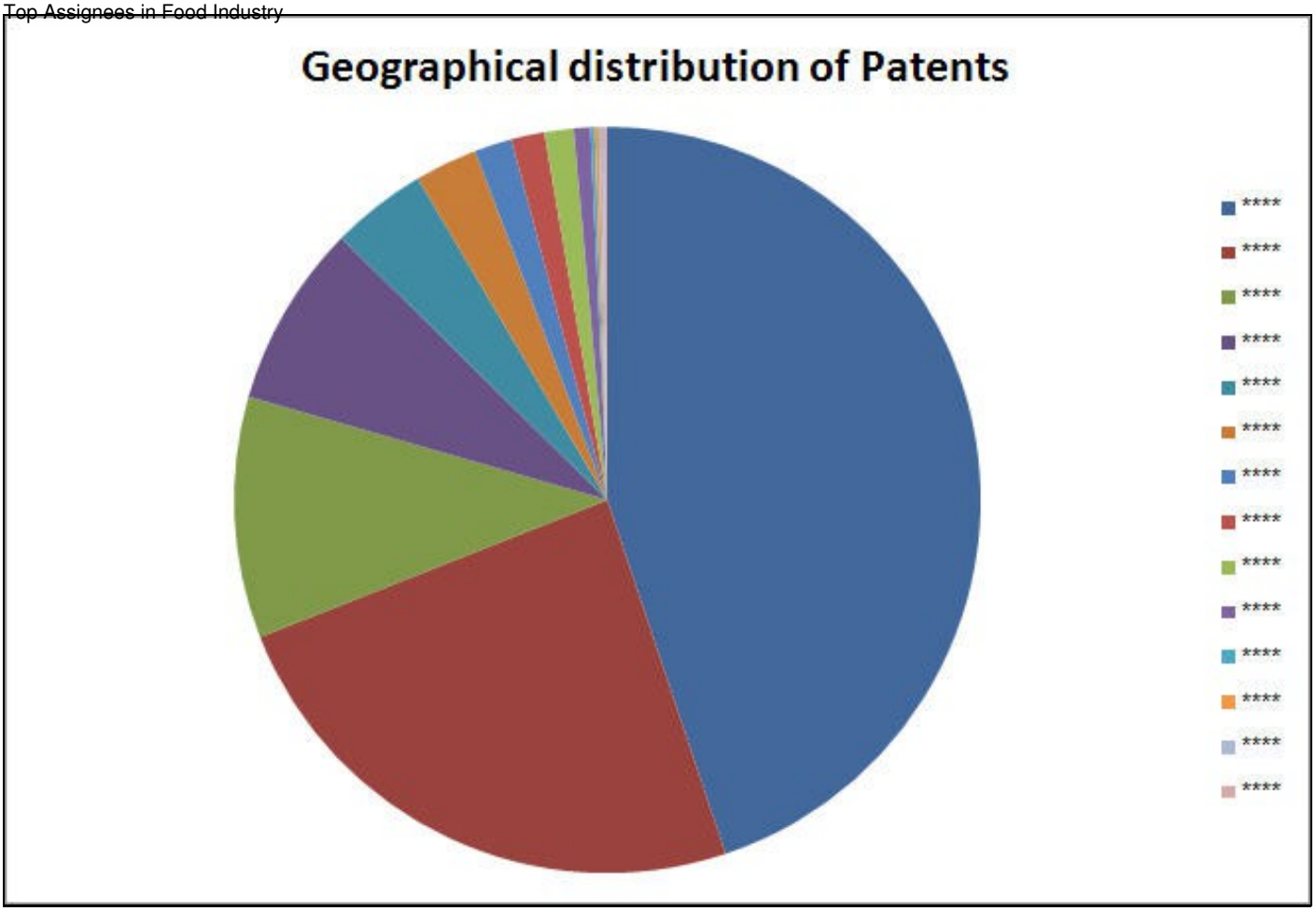
Top Assignees in Chemical Industry



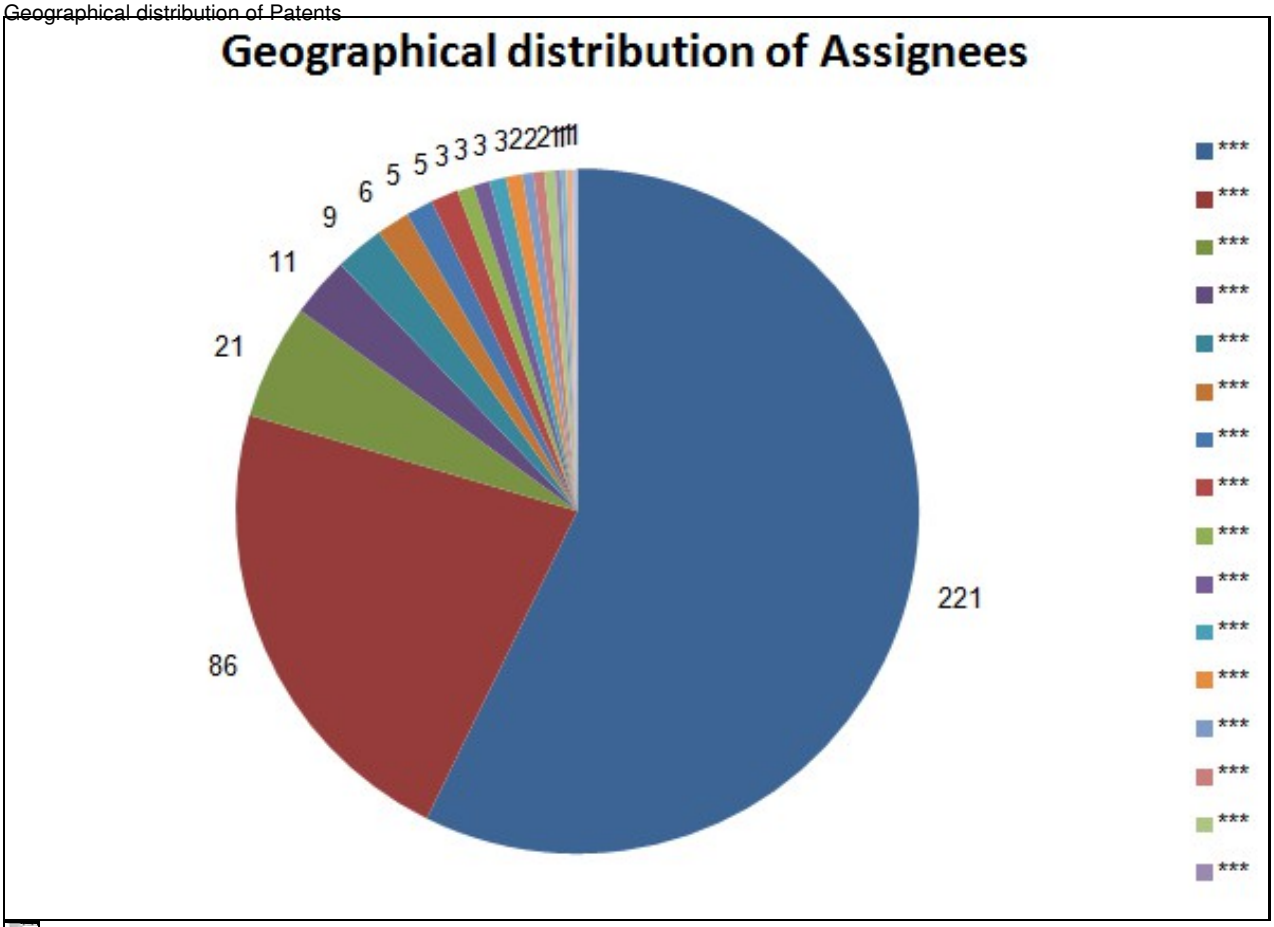
Top Assignees in FMCG Industry



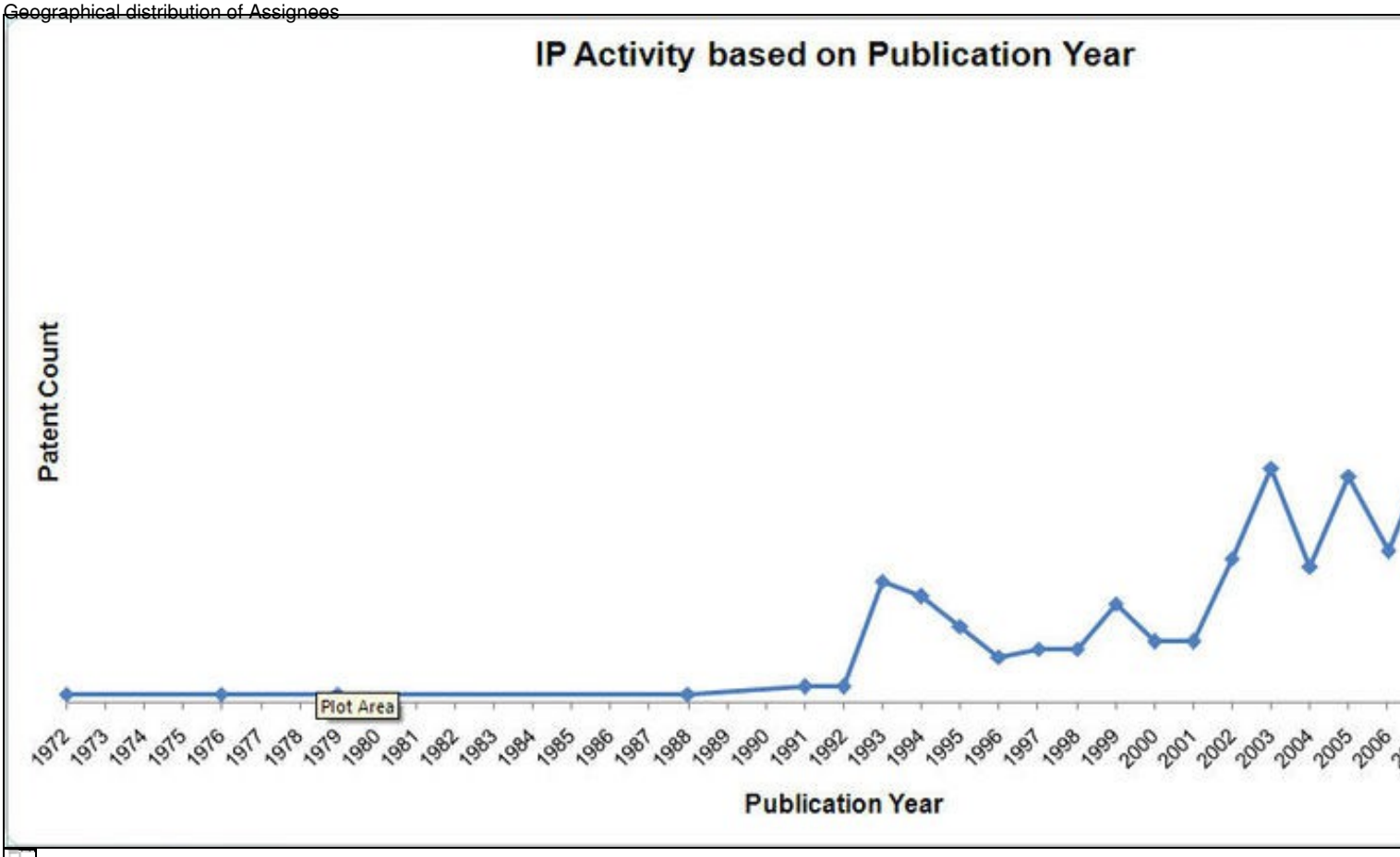
Top Assignees in Food Industry



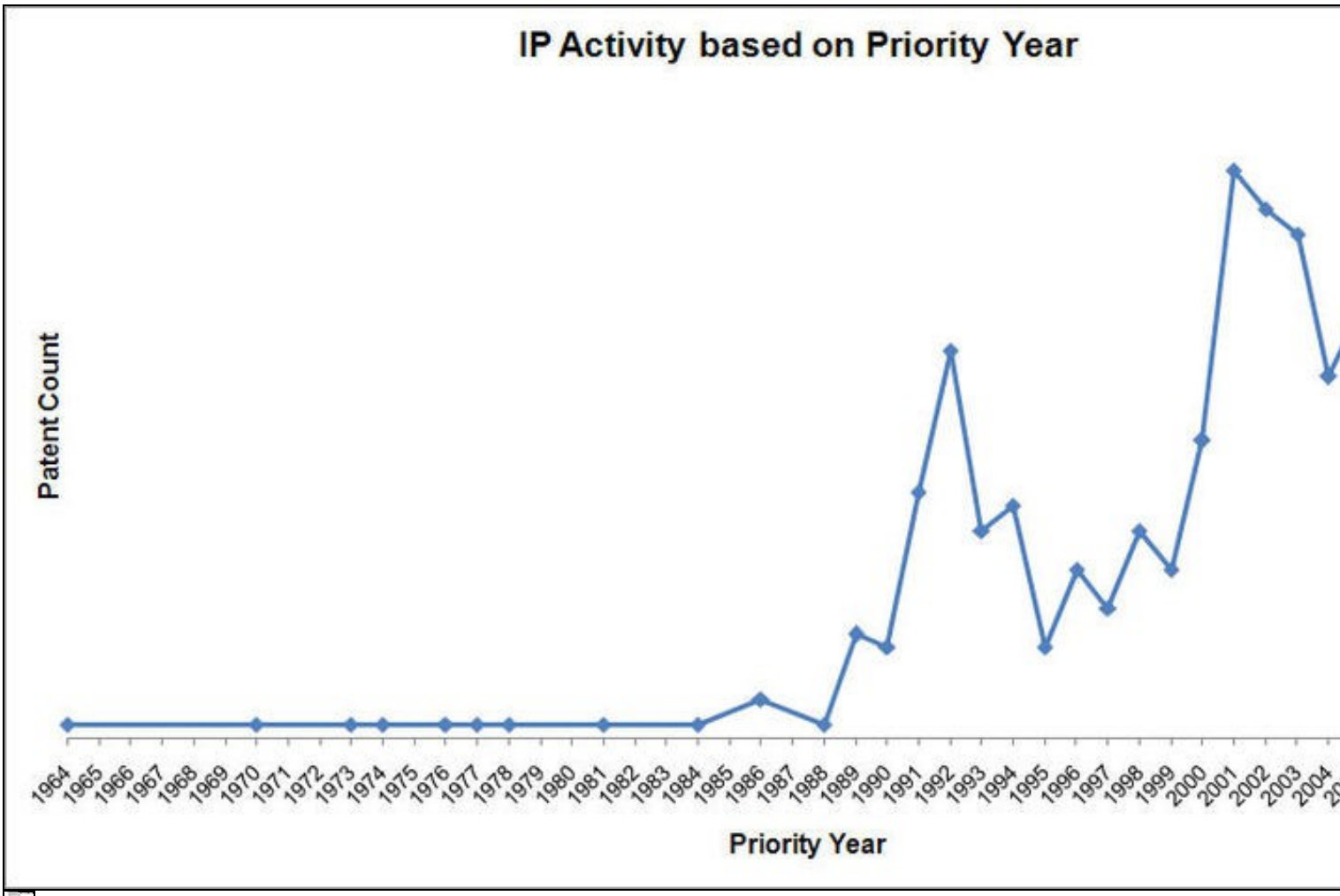
Geographical distribution of Patents



Geographical distribution of Assignees



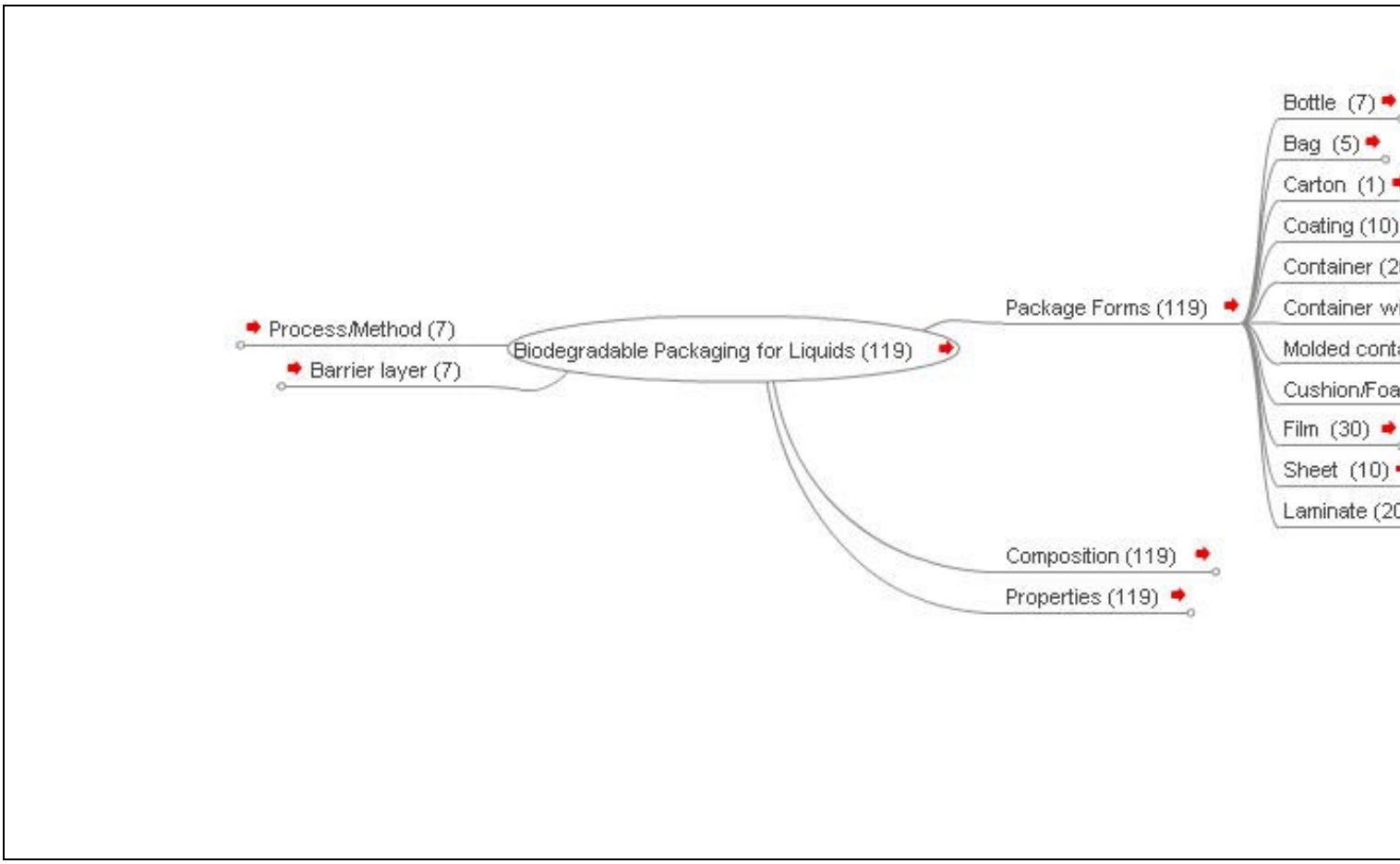
IP activity based on Publication Year



IP activity based on Priority Year

Interactive taxonomy

- *Use the mouse(click and drag/scroll up or down/click on nodes) to explore nodes in the detailed taxonomy*
- *Click on the red arrow adjacent to the node name to view the content for that particular node in the dashboard*



Dashboard link



NOTE:

- Flash Player is essential to view the Dolcera dashboard.
- Patents for which data is not available are analysed based on DWPI data which can not be disclosed due to legal issues.

Patent to Product Mapping

S.No.	Publication No.	Title	Assignee
1	WO2011119222	Container with an integral lid	EARTHKARE PACKAGING INNOVATIONS COMPANY
2	WO2009055067	Beverage container lid having liquid cooling effect	COOLLID CORPORATION
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]

