

# Biodegradable packaging for liquids

## Contents

- 1 Objective
- 2 Search methodology
- 3 Background
- 4 Concept Table
- 5 Search strategy
  - ◆ 5.1 Patents
    - ◇ 5.1.1 Thomson innovation
  - ◆ 5.2 Relevant Class Codes and Definitions
    - ◇ 5.2.1 IPC/ECLA
    - ◇ 5.2.2 US Class
    - ◇ 5.2.3 F Term
- 6 Relevant Patents
- 7 Trends and Insights
- 8 Sample Analysis Sheet
- 9 Market Research Information
- 10 Assignee analysis and IP activity
- 11 Interactive taxonomy
- 12 **Dashboard link**
- 13 Patent to Product Mapping

## Objective

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

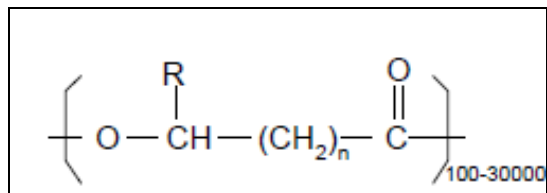
**Comment:** The idea is to find out the innovative market players in this technology area, those are the players that are the most technologically advanced in the market place. Intellectual Property that these players hold is taken as a measure of their technological prowess in this particular area. 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.                                                                                                          |

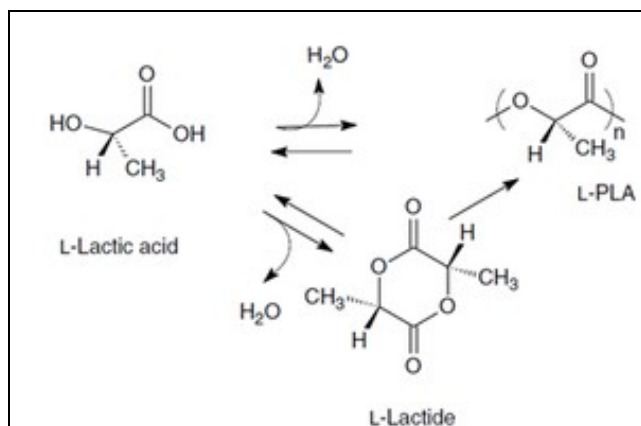
## Background

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-hydroxyvalerate)
- 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

Poly(lactic acid) (PLA) is another biopolymer with environmental benefit. Poly(lactic 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/poly\(lactic\\_acid\)\\_technology.pdf](http://www.jimluntllc.com/pdfs/poly(lactic_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                    | Biodegradable 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                    | Biodegradable 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                     | Biodegradable 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 Definitions

### 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 |
| ****        | ****          |

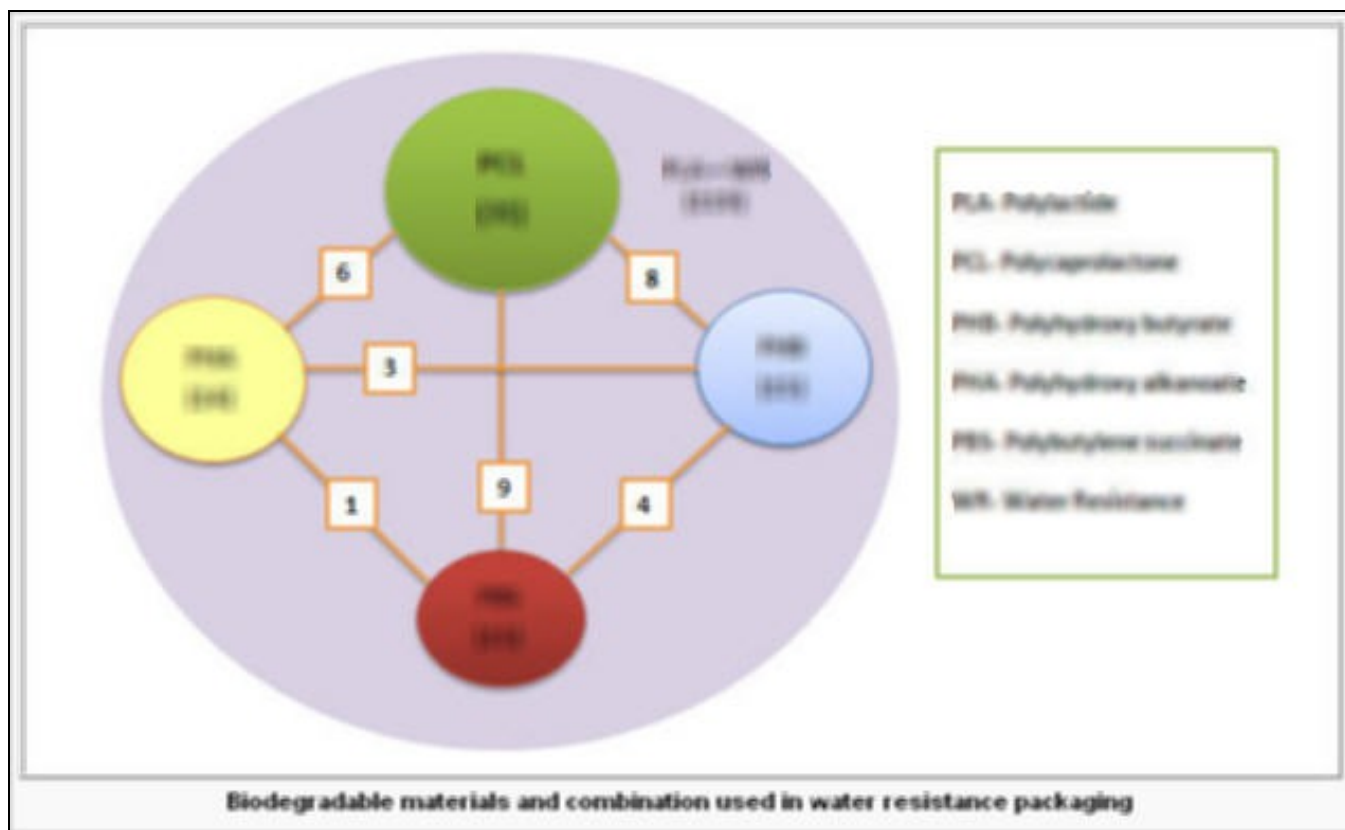
### F Term

| 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      | <a href="#">US7951438</a>     | 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 <sup>2</sup> /day or better at 38°C. and 90% RH |
| 2      | <a href="#">US20110076511</a> | 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

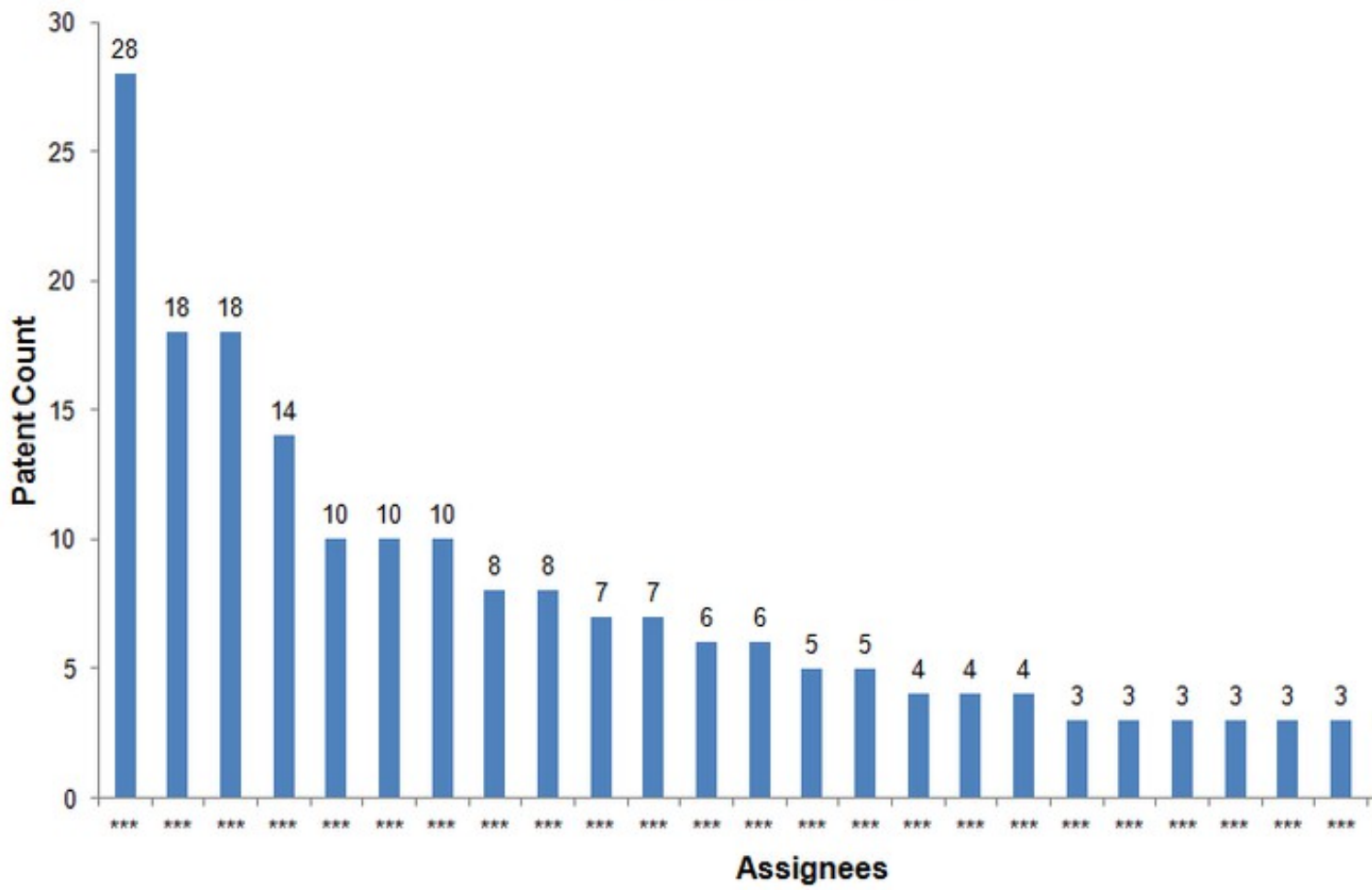
### Sample Analysis Sheet

#### Market Research Information

For market information on Biodegradable packaging for liquids, please click [here](#)

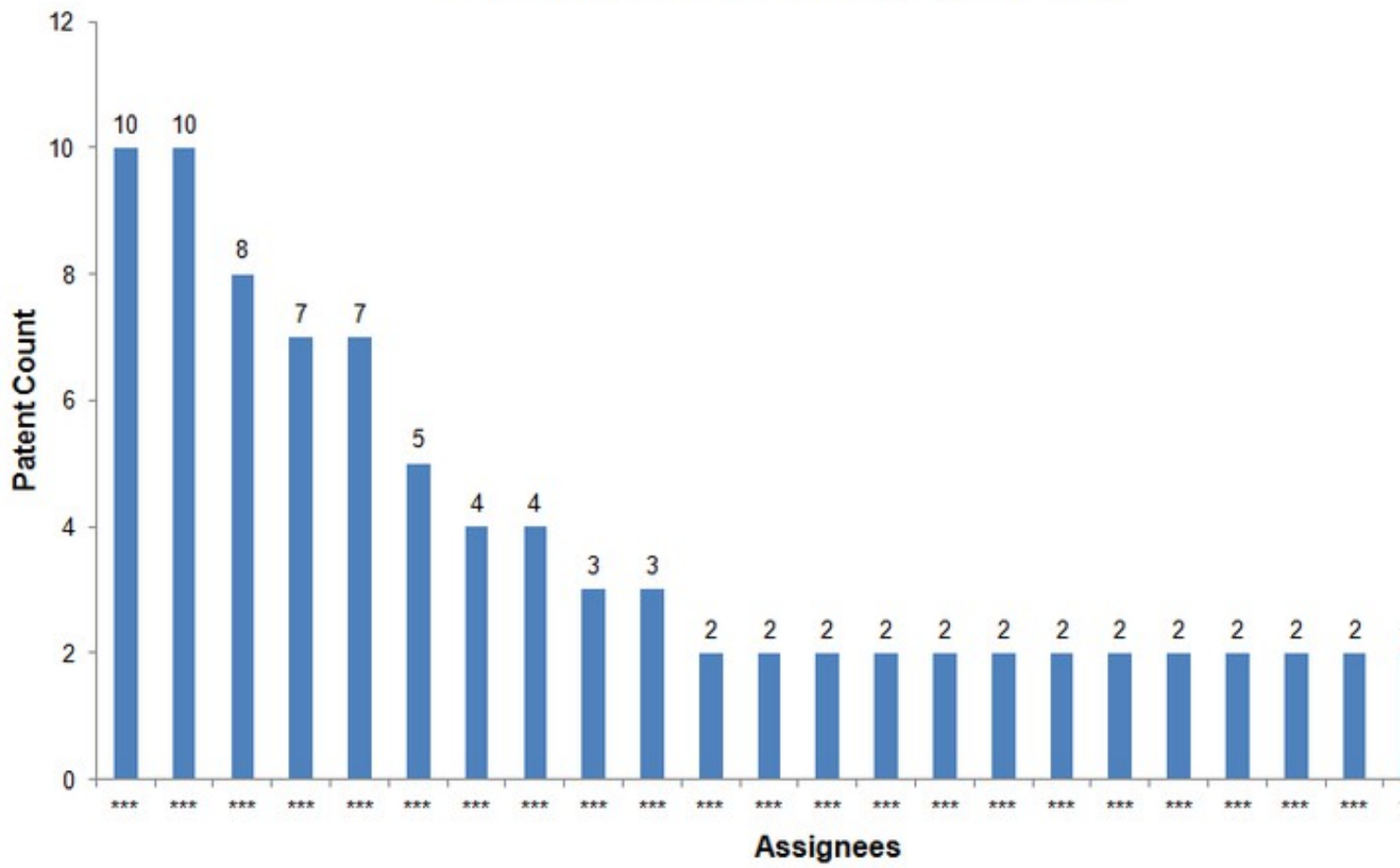
#### Assignee analysis and IP activity

## Top Assignees



Top Assignees in this technology area

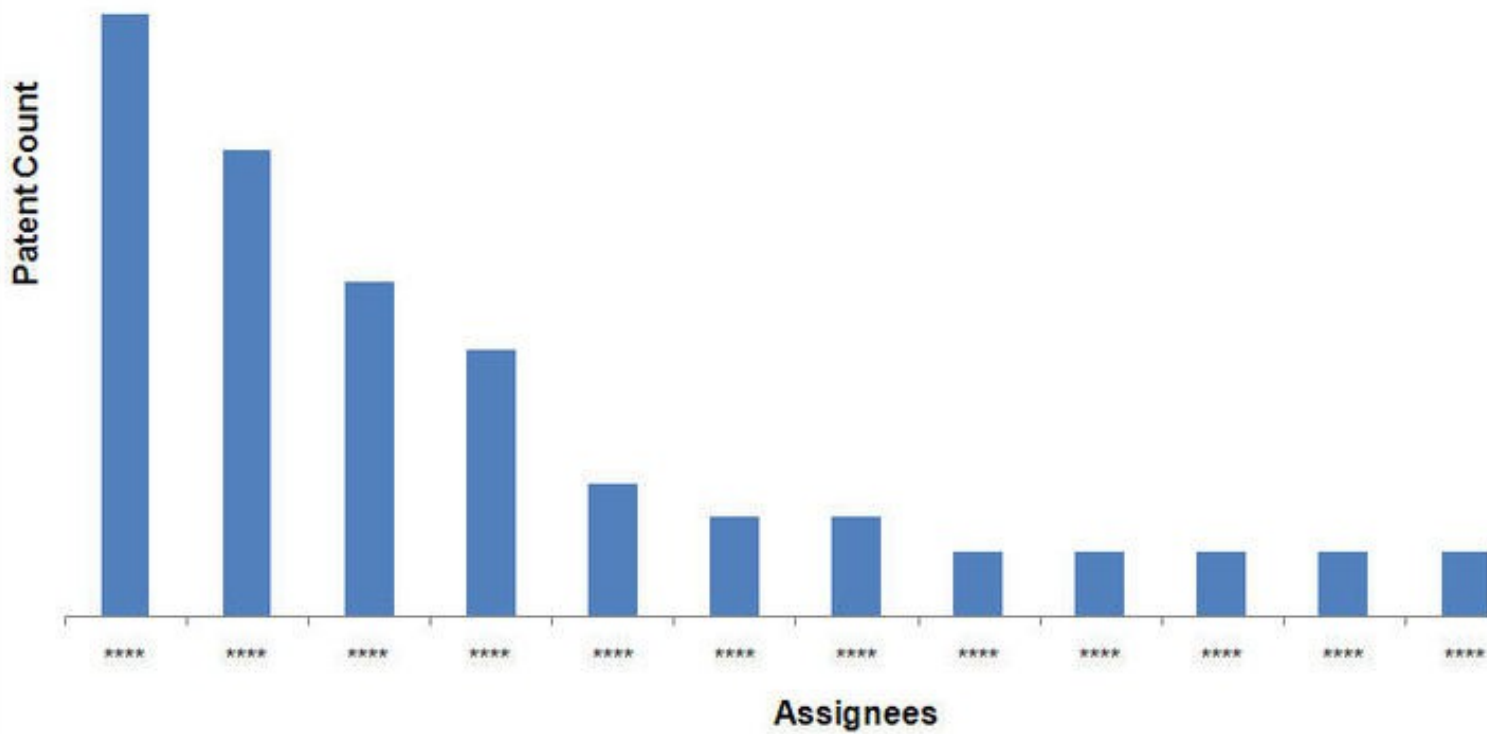
## Top Assignees in Packaging Industry



Top Assignees in Packaging Industry

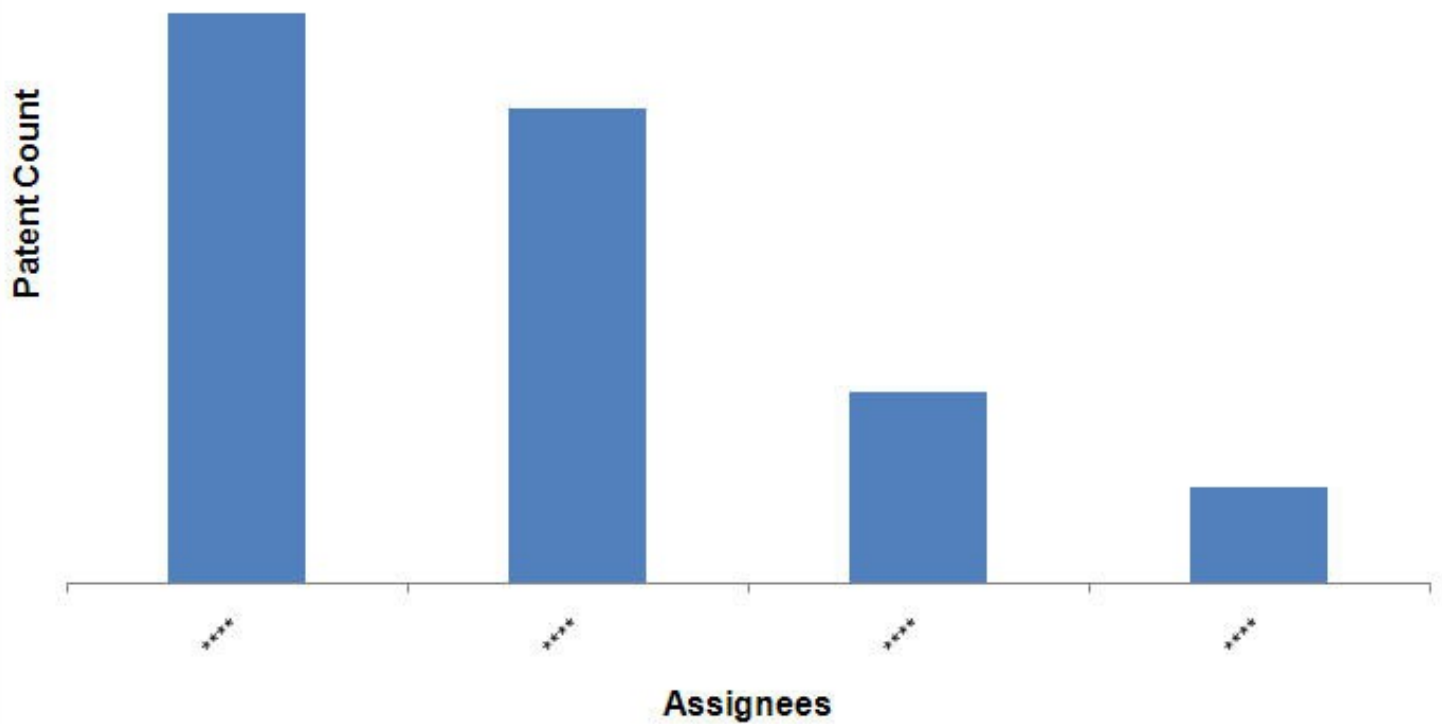


## Top Assignees in Chemical industry



Top Assignees in Chemical Industry

## Top Assignees in FMCG

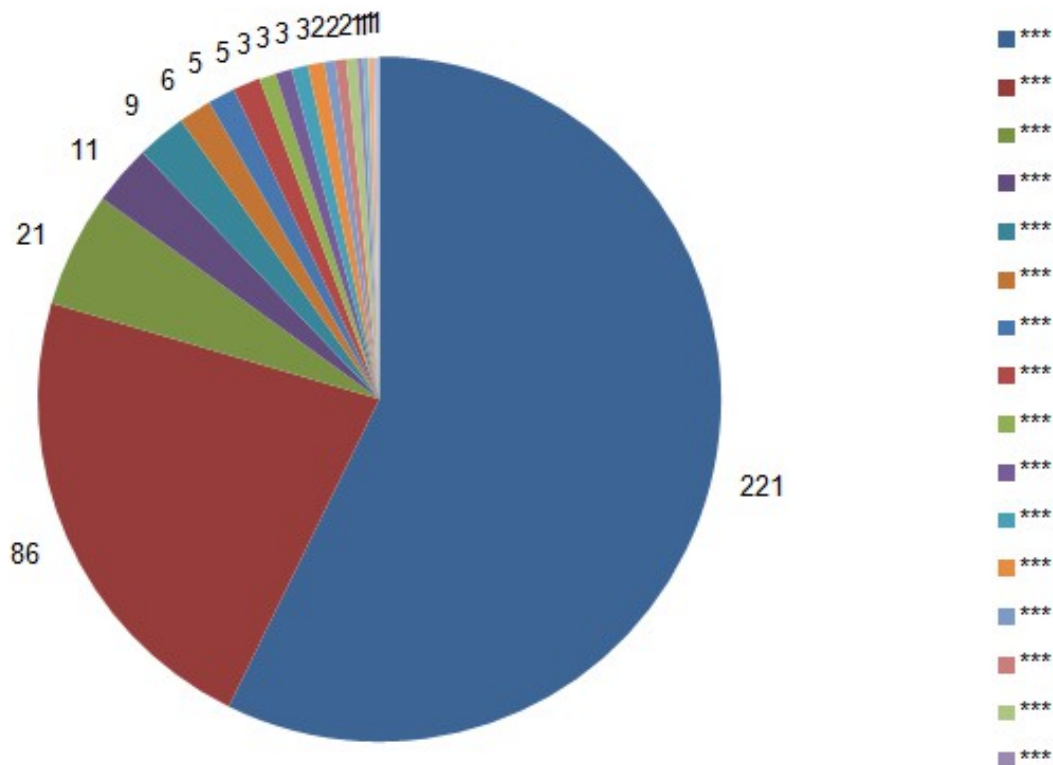






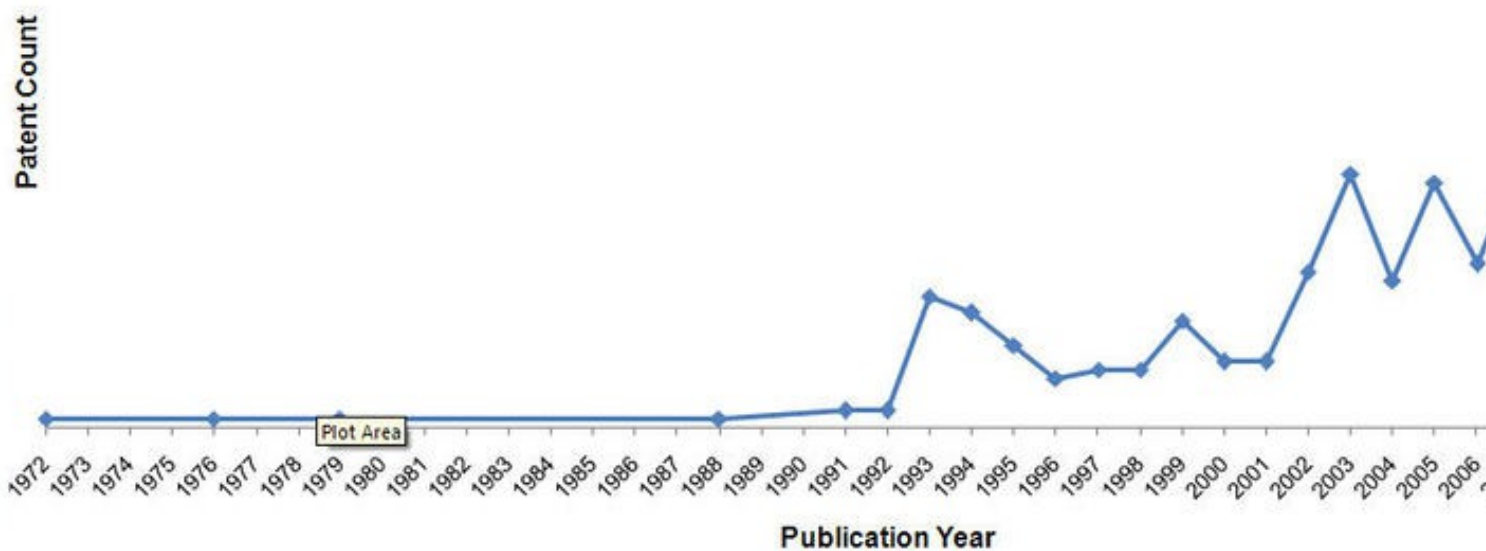
Geographical distribution of Patents

## Geographical distribution of Assignees



Geographical distribution of Assignees

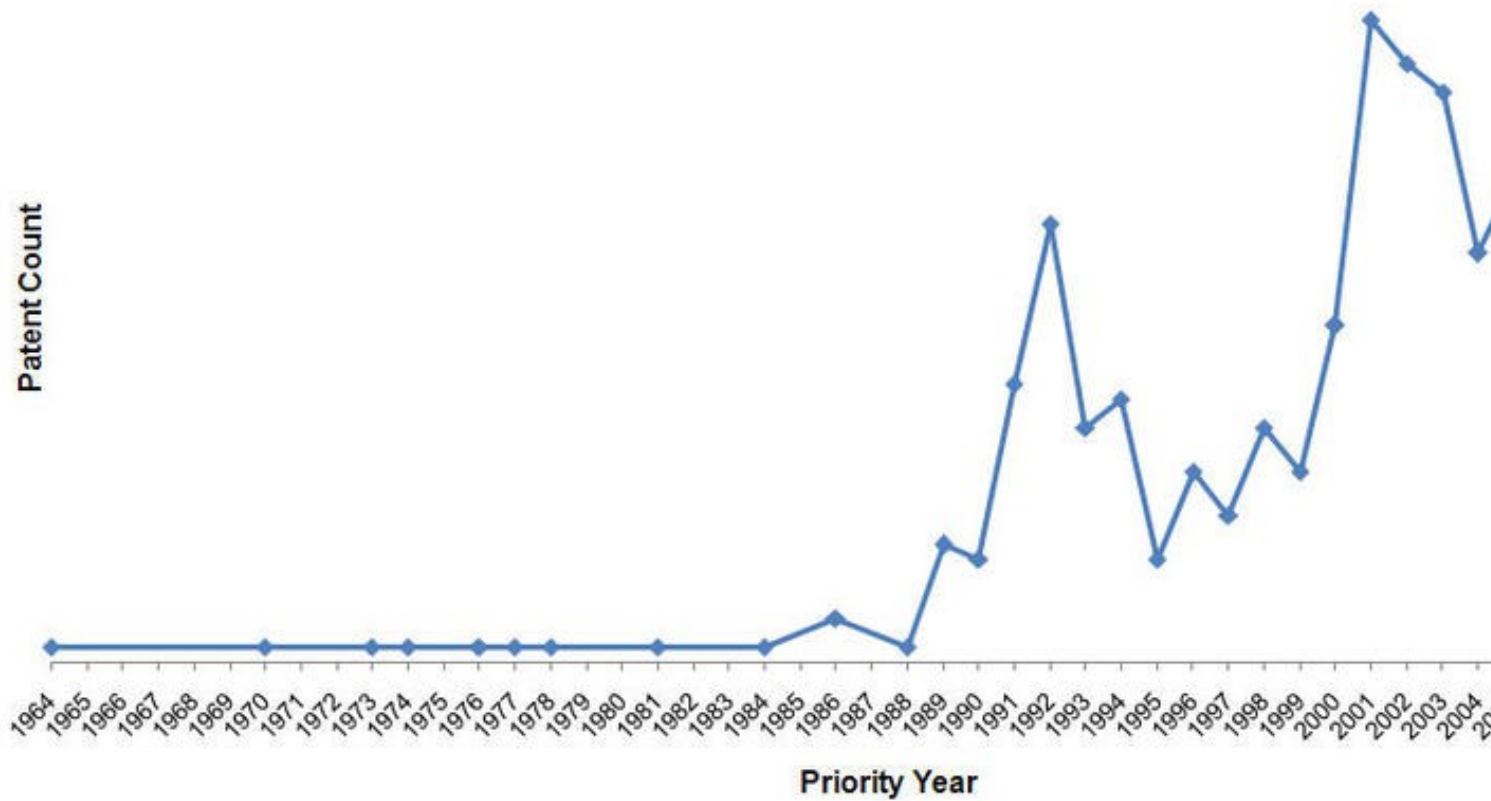
## IP Activity based on Publication Year



IP activity based on Publication Year

## IP Activity based on Priority Year

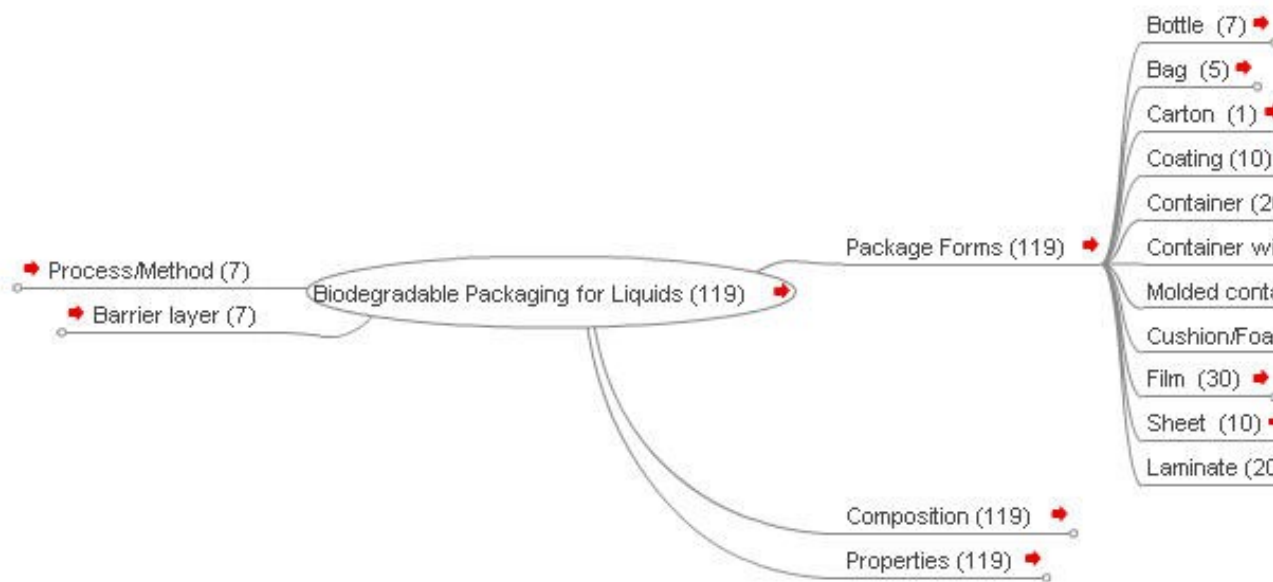
Patent Count



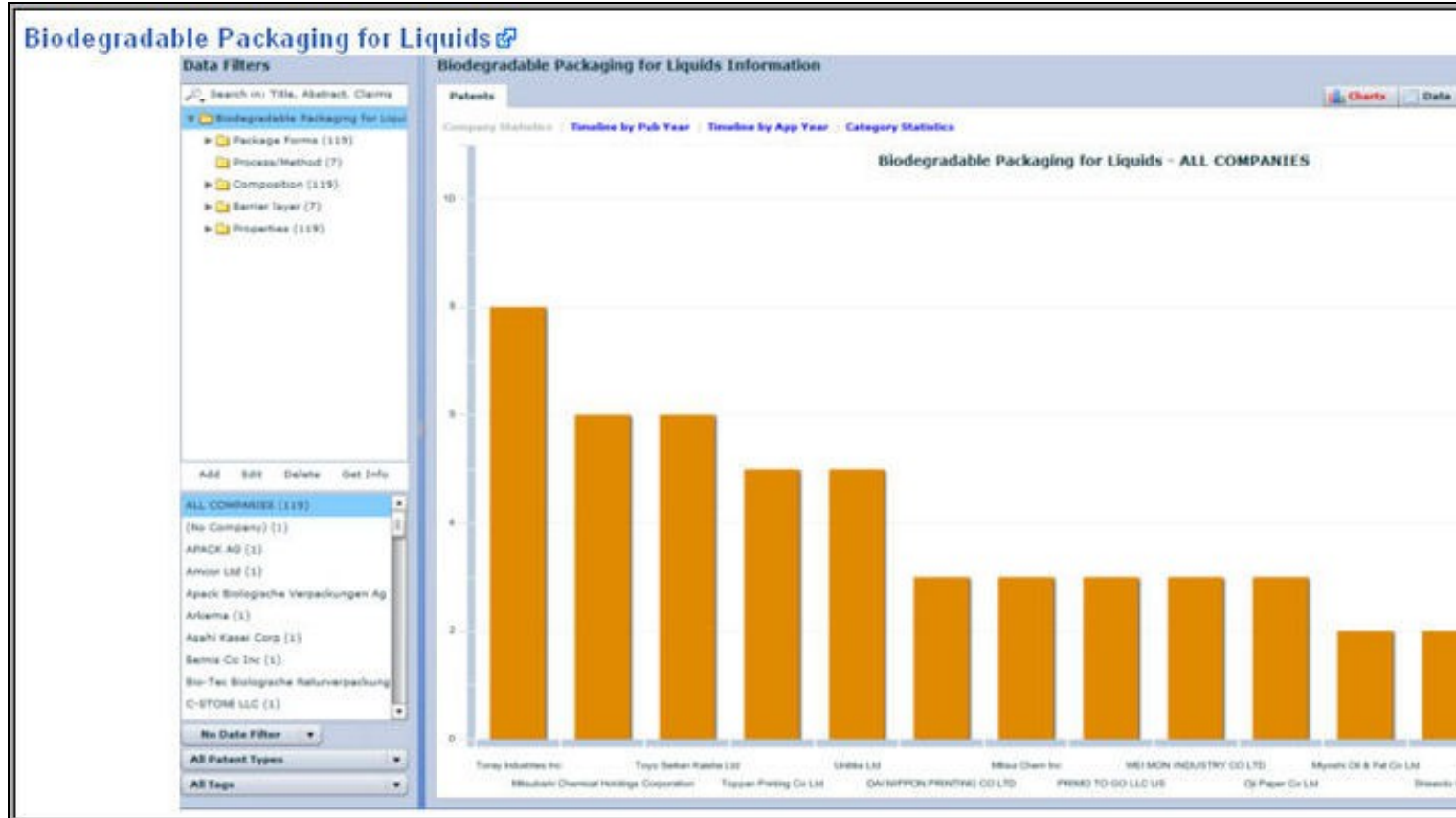
IP activity based on Priority Year

### 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     | <a href="#">WO2011119222</a> | Container with an integral lid                      | EARTHKARE PACKAGING INNOVATIONS COMPANY |
| 2     | <a href="#">WO2009055067</a> | Beverage container lid having liquid cooling effect | COOLLID CORPORATION                     |
| 3     | <a href="#">WO2011020822</a> | Cellulose based recyclable container                | REDWOOD, INC.                           |
| 4     | <a href="#">WO2011020822</a> | Barrier film                                        | PLASTIC TECHNOLOGY                      |

