CRISPR PATENT LANDSCAPE

July 2015

IPStudies

Intangible assets deserve closer scrutiny

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Our team

Corinne LE BUHAN, PhD

ICT Expert

IP Strategy & Management

- Funded IPStudies in 2010 to help Swiss & EU high-tech SMEs develop and execute their IP valuation plans
- 12+ years experience in IP strategy and management –former VP Knowledge Management of Nagravision-Kudelski Group, in charge with patents (200 families), standards, R&D collaborations, licensing and technical publications portfolios
- Teaches international licensing practices and IP strategy at IEEPI Paris & Bern – Advices EU Horizon2020 on Innovation in SMEs
- Patent licensing sales and marketing partner, ICT sector, for Florenus in Berlin - ICT Technology Expert for various licensing facilitators and aggregators in France and the US
- University postgrade in management of innovation and intellectual property (University of Strasbourg, 2008), PhD in Communications Science (EPFL, 1998), MsC in Electrical Engineering (INSA Rennes, 1994)
- Experienced with Patbase, EPO/RegisterPlus, USPTO/PAIR
- International network of IP practitioners and licensing managers - Member LES, IEEE, AROPI, AAIEEPI

Fabien PALAZZOLI, PhD

Life Sciences Expert

Patent Analysis & Landscapes

- Joined IPStudies in 2013 to develop the IP analytics offering in life sciences & biotechnology
- 7+ years experience in technology transfers, patent mapping/landscaping and FTO-driven research intelligence for the French public sector and biotech SMEs - former IP analytics sales manager for FIST SA, the CNRS technology transfer office
- Author/co-author of 18 scientific and technical publications/communications, as well as one book chapter
- Life sciences patent analyst for various biotech/medtech SMEs in Switzerland and in Europe
- PhD in Life Sciences (*Exploitation of patent information in a public research laboratory: identification of technological niches in bioproduction and gene therapy*, University of Tours, 2011), MsC in Biotechnology and Law (University of Tours, 2007)
- Experienced with Orbit, Patbase, Intellixir, patent offices databases
- International network of patent information analysts

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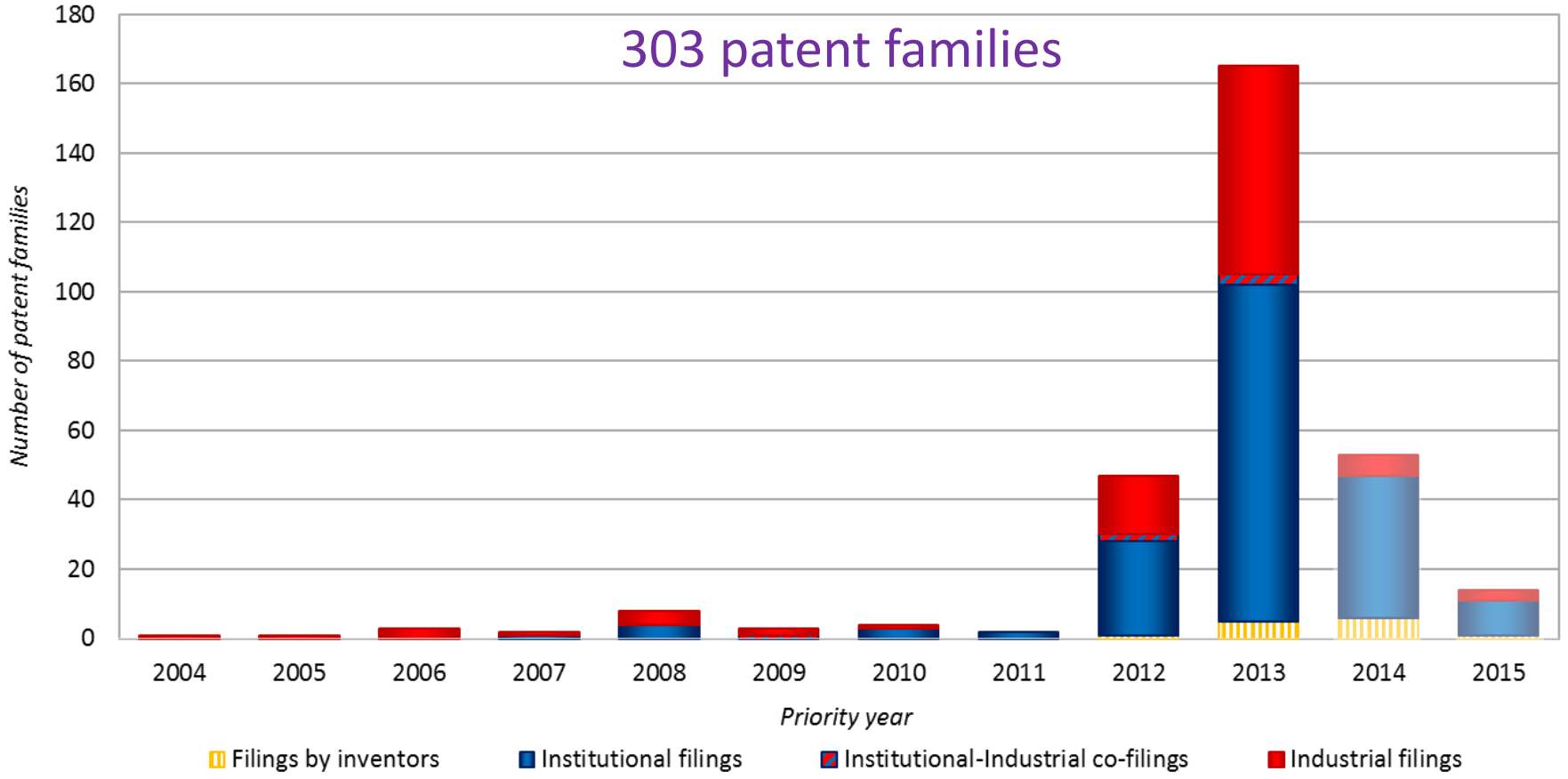
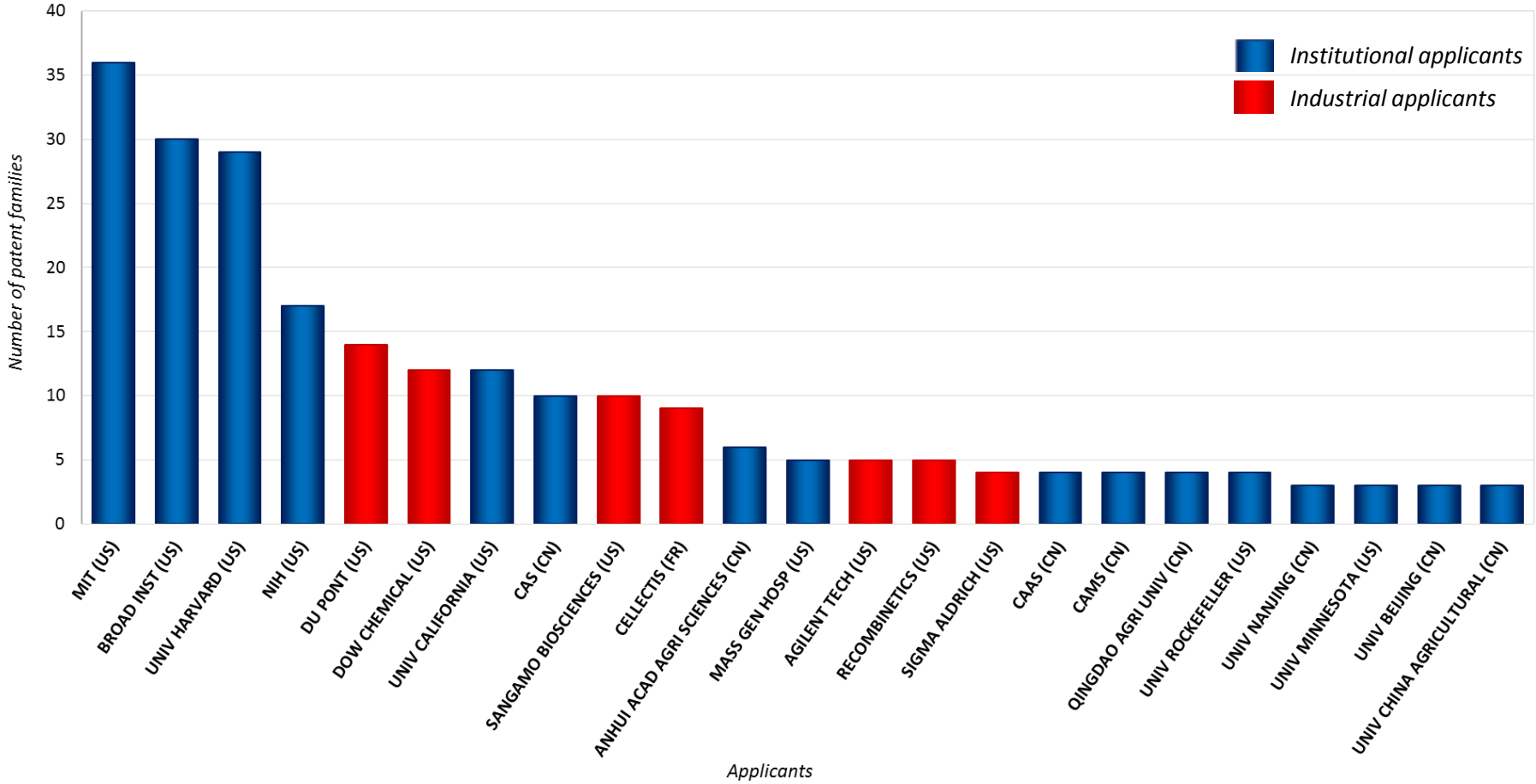
Temporal distribution of patent filings by type of applicants (2004-2015)



- 185 filings by institutional applicants (61.0%).
- 99 filings by industrial applicants (32.7%).
- 13 filings by individual inventors (4.3%).
- 6 co-filings between industrial applicants and institutional applicants (2.0%).
- The years 2014 and 2015 are not complete due to the delay of publication of 18 months.

Main patent applicants (≥ 3 patent families)



- Affiliates & subsidiaries have been gathered under their parent company (Danisco with DuPont…). Co-filings are counted for each co-owner: a patent application co-filed between the MIT, the Harvard University and the Broad Institute is counted once for each of this applicant.
- Within the 23 main applicants, 16 are institutional applicants and 7 are industrial applicants.
- The patent portfolio of DuPont comprises historical patent families on CRISPR sequences dealing with the typing of bacterial strains, cultures with improved phage resistance and applications for preparing food.

Breakdown of the CRISPR patent database

The 303 patent families have been manually classified

CLAIM COVERAGE OF PATENT FAMILIES

Applications

- Genome editing with EN
- Modulation of gene expression
- NAi-like system
- Therapeutic application
- Bioproduction
- Other application

Cells and organisms

- Human cell
- Mammalian cell
- Mammal
- Other animal cell
- Other animal
- Plant cell
- Plant
- Fungi-algae-yeast
- Other organism
- Eukaryotic cell
- Prokaryotic cell
- Undefined cell
- Undefined organism

Molecular tools

- TAL Effectors
- NA-targeting RNA
- TALEN
- CRISPR-assoc. protein
- CRISPR-Cas system
- Nuclease
- ZF Nuclease
- Meganuclease
- Chimeric TF
- Other chimeric protein
- Vector
- CRISPR sequence

COMPONENTS

DNA-Binding Domains

- ZF Domains
- DBD from meganuclease
- TAL Effectors
- NA-targeting RNA
- Other DBD
- Undefined DBD

Catalytic domains

- Nuclease
- Meganuclease
- CRISPR-assoc. protein
- Recombinase
- Integrase
- Repressor-Activator
- Methyltransferase
- Demethylase
- Acetyltransferase
- Deacetylase
- Kinase
- Other catalytic domain
- Undefined catalytic domain

CHIMERIC PROTEINS

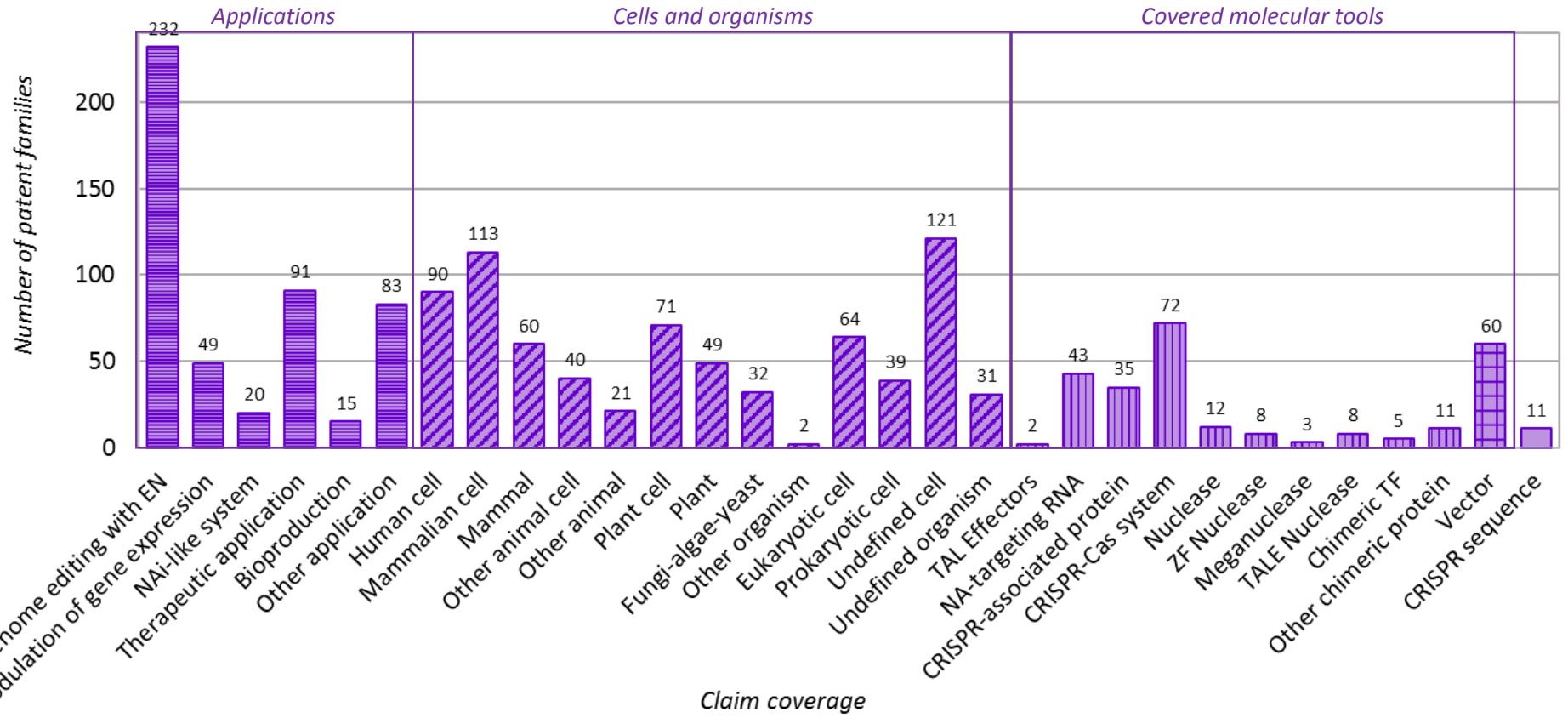
Chimeric nucleases

- ZF Nuclease
- Meganuclease
- TALE Nuclease
- RNA-Guided Nuclease
- Other chimeric nuclease
- Undefined nuclease

Other chimeric proteins

➢ **A patent family can be classified in several categories (e.g. “Genome Editing with EN" and "Therapeutic application“ and “Human cell“ and “CRISPR-Cas system“ …).**

Breakdown by Claim coverage of patent families
Breakdown of the patent portfolio

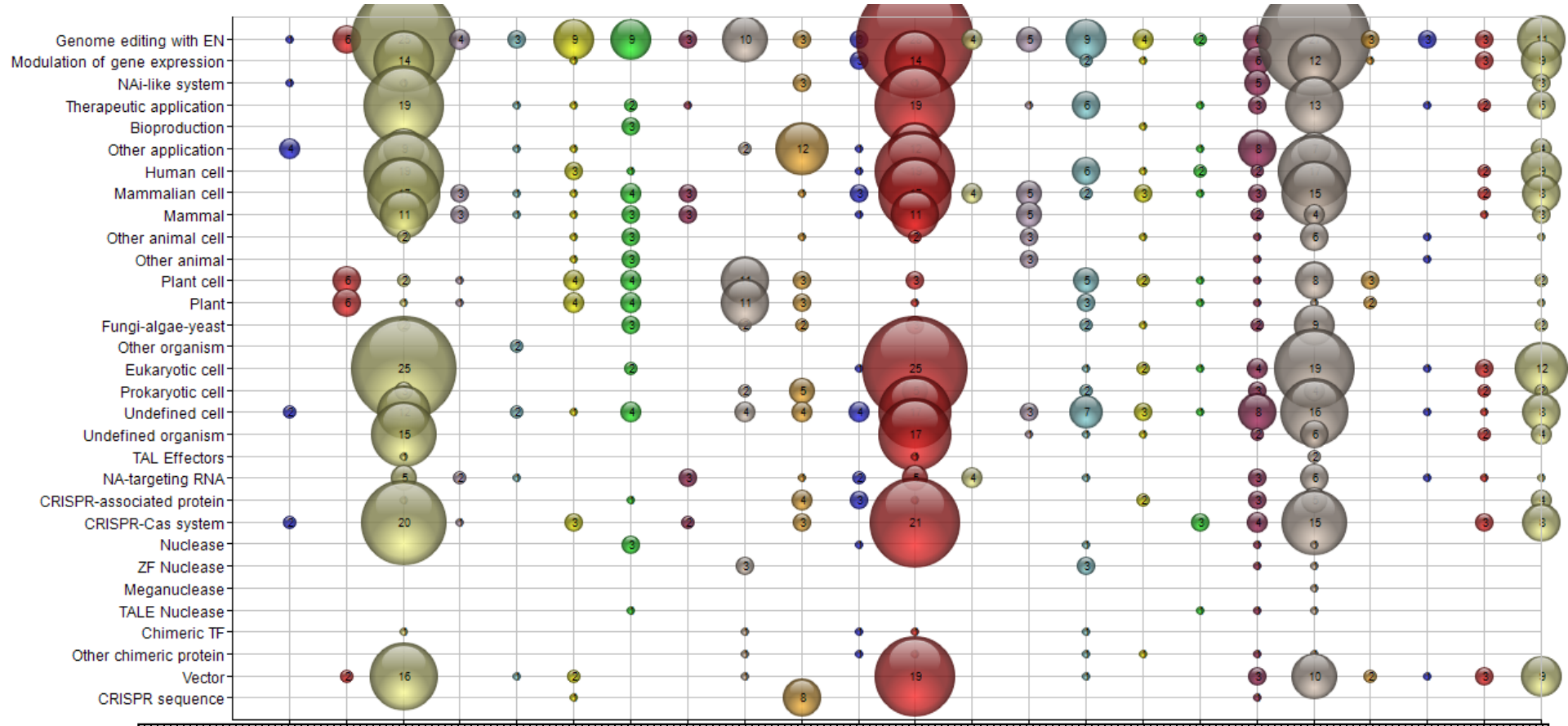


EN = Engineered Nucleases

NA-targeting RNA = Nucleic Acid-targeting RNA, guide RNA…

Breakdown by Claim coverage of patent families

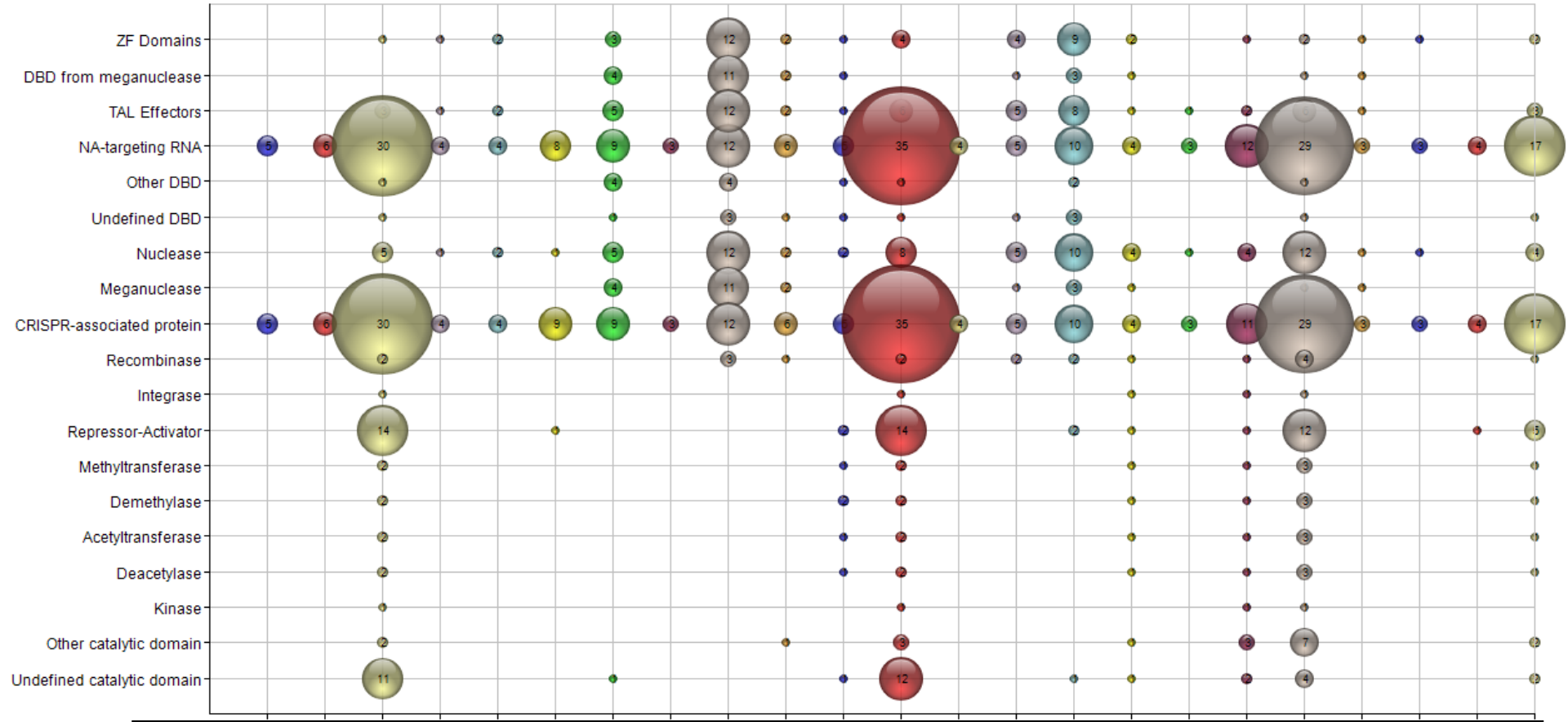
Positioning of the main applicants (≥ 3 patent families)



Applicants with at least 3 patent families in their patent portfolio

Breakdown by Components

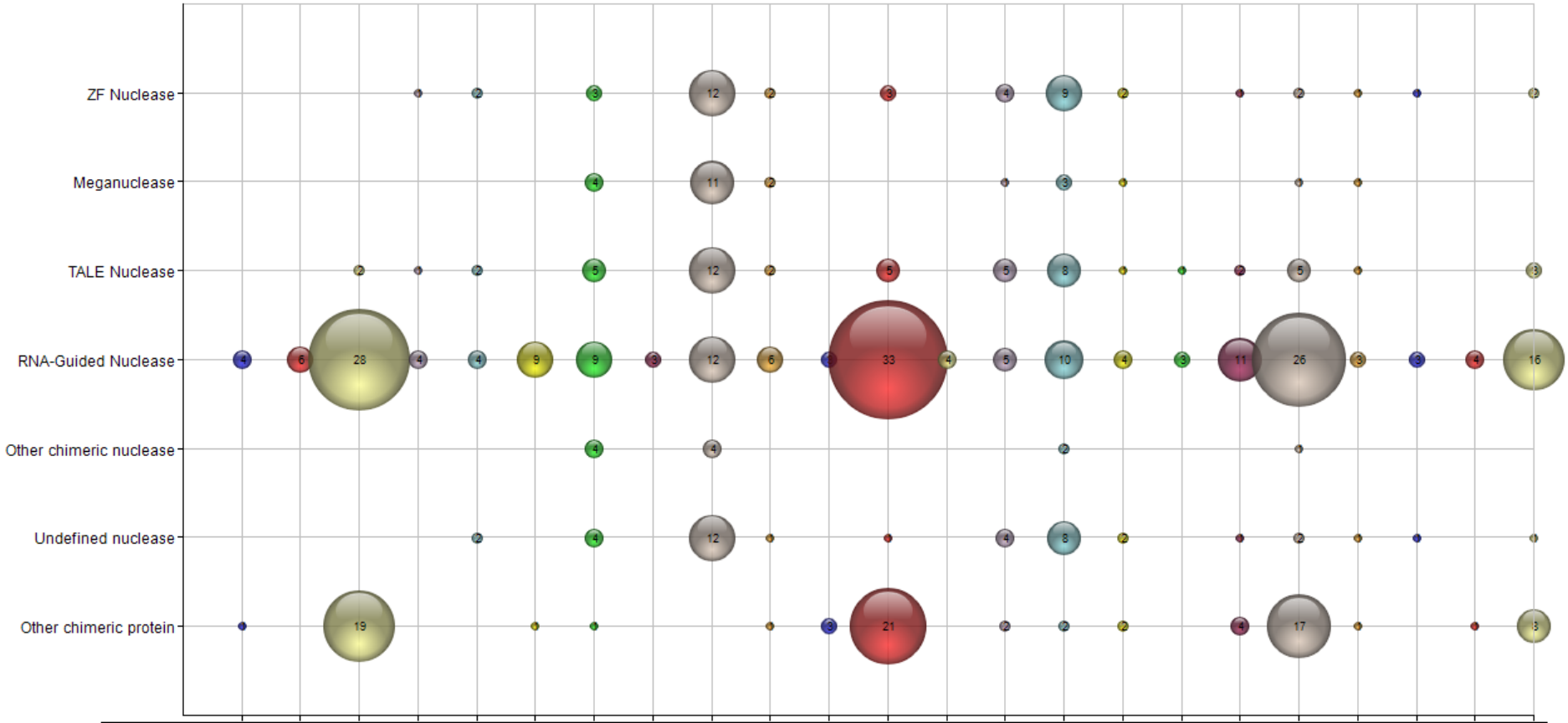
Positioning of the main applicants (≥ 3 patent families)



Applicants with at least 3 patent families in their patent portfolio

Breakdown by Chimeric proteins

Positioning of the main applicants (≥ 3 patent families)



Applicants with at least 3 patent families in their patent portfolio

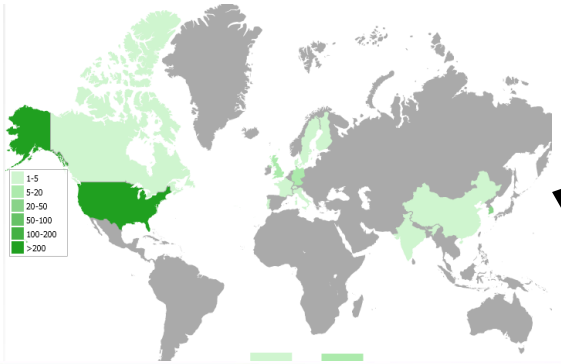
Main forward cited patent families (2)

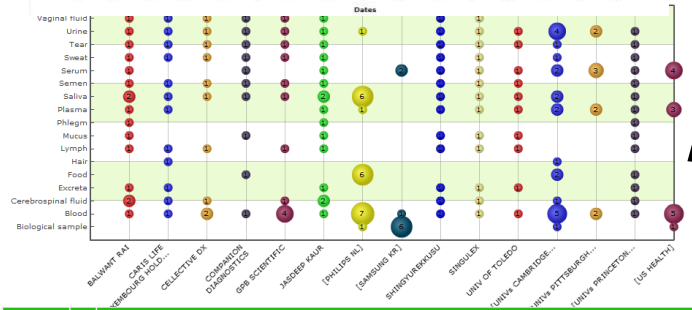
REPRESENTATIVE PATENT NUMBER	TITLE OF THE REPRESENTATIVE PATENT NUMBER	APPLICANT(S)	NB OF CITATIONS
WO2010054108	CAS6 POLYPEPTIDES AND METHODS OF USE	UNIV GEORGIA (US)	12 (0 self citat.) (2 cat. X or Y)
Other patent family			
WO2014065596	COMPOSITION FOR CLEAVING A TARGET DNA COMPRISING A GUIDE RNA SPECIFIC FOR THE TARGET DNA AND CAS PROTEIN-ENCODING NUCLEIC ACID OR CAS PROTEIN, AND USE THEREOF	TOOLGEN (KR)	11 (0 self citat.) (1 cat. X or Y)
Other patent family			
WO2010075424	COMPOSITIONS AND METHODS FOR DOWNREGULATING PROKARYOTIC GENES	UNIV CALIFORNIA (US)	9 (0 self citat.) (3 cat. X or Y)
Other patent family			
WO2006073445	DETECTION AND TYPING OF LACTOBACILLUS BACTERIAL STRAINS	DU PONT DE NEMOURS (US)	9 (3 self citat.) (3 cat. X or Y)
Other patent family			

Further analysis

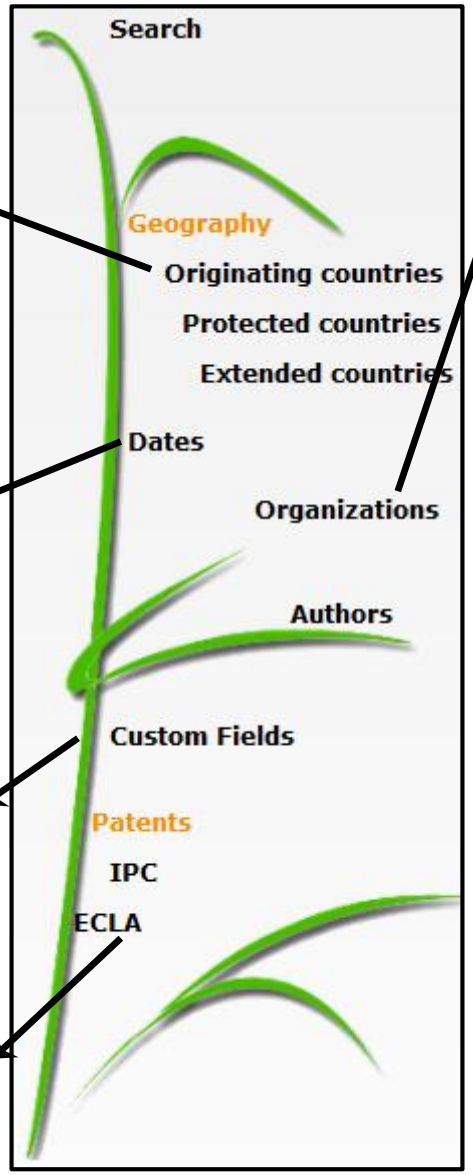
- Patent portfolios of specific applicants
- Patents filed in a country (US…) or a region (EP…), for a defined period
- Patents covering a application, a technology, or a specification defined by/with the customer
- Legal status of relevant patents; claim coverage prosecution monitoring
- Zoom on dedicated technology or functional subsets
- …

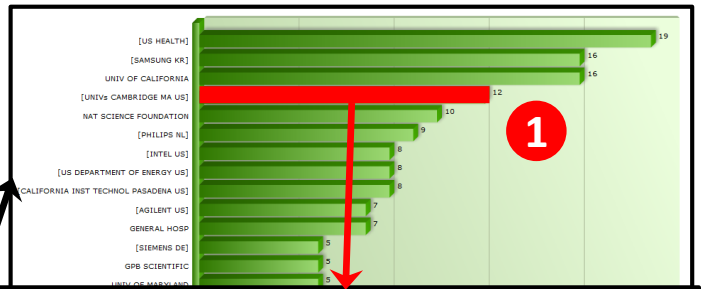
Access to the interactive and dynamic patent database

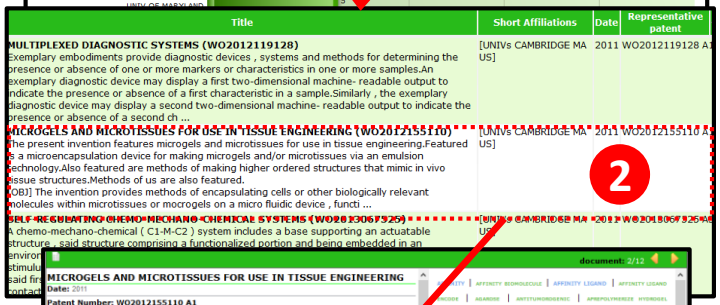


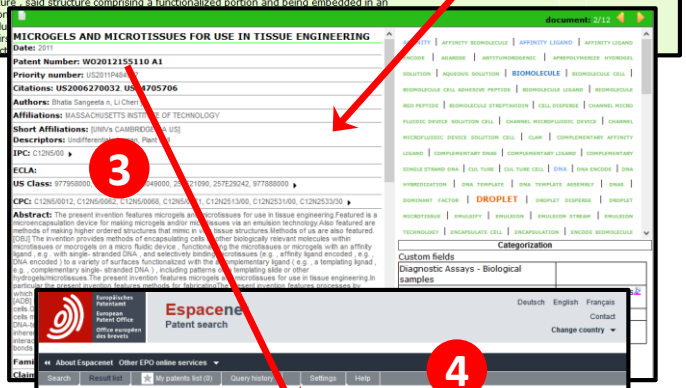


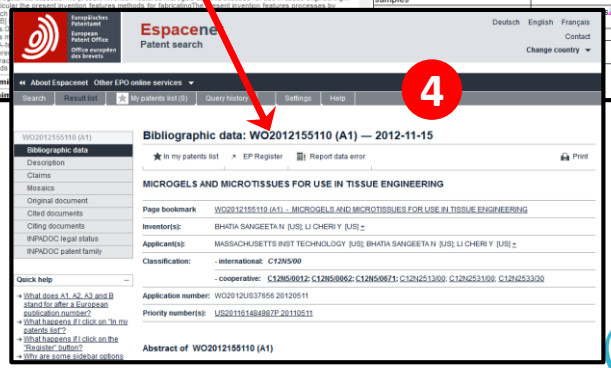
IPC	#Doc	Description
B01L3/00	107	Containers or dishes for laboratory use, e.g. laboratory glassware
C12Q1/68	104	Measuring or testing processes involving enzymes or micro-organisms, involving nucleic acids
C12M1/34	96	Apparatus for enzymology or microbiology, Measuring or testing with condition measuring or sensing means, e.g. colony counters
G01N33/53	89	Investigating or analysing materials by specific methods not covered by groups , Biological material, e.g. blood, urine, Chemical analysis of biological material, e.g. blood, urine, Immunoassay
G01N33/543	77	Investigating or analysing materials by specific methods not covered by groups , Biological material, e.g. blood, urine, Chemical analysis of biological material, e.g. blood, urine, Immunoassay, with an insoluble carrier for immobilising immunochemicals
C12M1/00	68	Apparatus for enzymology or microbiology
G01N33/00	67	Investigating or analysing materials by specific methods not covered by groups
C12Q1/00	58	Measuring or testing processes involving enzymes or micro-organisms
G01N37/00	52	Details not covered by any other group of this subclass
G01N21/00	49	Investigating or analysing materials by the use of optical means, i.e. using infra-red, visible, or ultra-violet light
B01J19/00	40	Chemical, physical, or physico-chemical processes in general
C12M3/00	35	Tissue, human, animal or plant cell, or virus culture apparatus
G01N33/48	35	Investigating or analysing materials by specific methods not covered by groups , Biological material, e.g. blood, urine











Order

This is only a sample report with partial data. Our full offer includes:

- an **analysis of the patent landscape**, covering 303 patent families, worldwide
- a **synthesis of IP strategy findings**, to visualize key trends in terms of patent applicants, collaboration networks, competitor technology positioning, key inventors and R&D white spaces out of the landscape
- an **on-line access to the selected patent set**, so you can visualize, navigate, focus and extract the most relevant patent data according to your specific needs.

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