



**PRODUCT
PERFORMANCE
VALIDATION AND
TESTING**



Slitup©

Composite film patch for soft tissue regeneration

An Emerging Healthcare Product



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**Assoc. Prof. Ir. Dr. Zuratul
Ain Abdul Hamid**



**Dr. Muhammad Azrul
Zabidi**



Evelyn Wong



Dr. Mamun Khan Sujon



Ruzalina Baharin



Siti Fatimah Samsurrijal



**Dr. Nawal Radhiah Abdul
Rahman**

Our Team Members



**PRODUCT
VALIDATION:
HEAVY METAL
ANALYSIS**

CERTIFICATE OF ANALYSIS (COA)

Measurement of Heavy Metals by GFAAS (Test Method: In-house Method USM/NPC/TM17A) &
Measurement of Mercury by FIMS (Test Method: In-house Method USM/NPC/TM18A)

Date of issue: 21 September 2022

Ref no.: PRN2022/538

Page 1 of 1

Client and Address:

INSTITUT PERUBATAN & PERGIGIAN
TERMAJU
SAINS @ BERTAM,
UNIVERSITI SAINS MALAYSIA,
JALAN BERTAM 2, MUKIM 6,
13200 KEPALA BATAS,
PULAU PINANG.

Sample Descriptions:

Name/ID : SLITUP IN 3% HNO₃
Received : Thursday, September 15, 2022, at 11.00 am
Registered : Thursday, September 15, 2022, at 11.02 am
Type : Liquid
Container : Centrifuge tube
Mfg. Date : NA
Exp. Date : NA
Batch No. : NA
KKM No. : NA

Test Performance Duration : 19 - 21 September 2022

Results:

No.	Test Parameter	Test Method	Poison Act 1952 (ppm)	LOD (ppm)	Results (ppm)
1	Arsenic (As)	GFAAS	5.00	1.875	ND
2	Cadmium (Cd)	GFAAS	0.30	0.15	ND
3	Plumbum (Pb)	GFAAS	10.00	2.50	ND
4	Mercury (Hg)	FIMS	0.50	0.01	ND

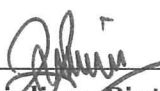
Opinions and interpretations : NA

Notes:

- GFAAS: Graphite Furnace Absorption Spectroscopy
- FIMS: Flow Injection Mercury System
- LOD: Limit of Detection
- ppm: Part per million
- ND: Not Detected
- NA: Not Available
- KKM No.: MAL No. or NOT No.
- Six points calibration curve ($R^2 > 0.995$)
 - As 0.015 - 0.100 ppm ($\mu\text{g/mL}$)
 - Pb 0.020 - 0.100 ppm ($\mu\text{g/mL}$)
 - Hg 0.0001 - 0.012 ppm ($\mu\text{g/mL}$)
 - Cd 0.0012 - 0.0048 ppm ($\mu\text{g/mL}$)

Terms and Conditions

- USM's laboratory is not involved in any sampling activity of the samples tested. The test results herein are only valid for the samples being tested, as provided by Client
- USM does not give any form of guarantee on the safety and quality of the tested samples or on the products.
- USM assumes no liability for any loss, expense or damage occasioned by use or interpretation of this test results.
- Any unauthorized use, alteration, forgery or falsification of the content or appearance of this Certificate is unlawful and offenders may be prosecuted to the fullest extent of the law.
- Full laboratory address: Toxicology Laboratory of National Poison Centre, Block JO6, National Poison Centre, Universiti Sains Malaysia, 11800 Penang.


ChM. Norjuliana Binti Mohd. Noor
(IKM No: M/2947/5743/10)
Approved Signatory/ Science Officer

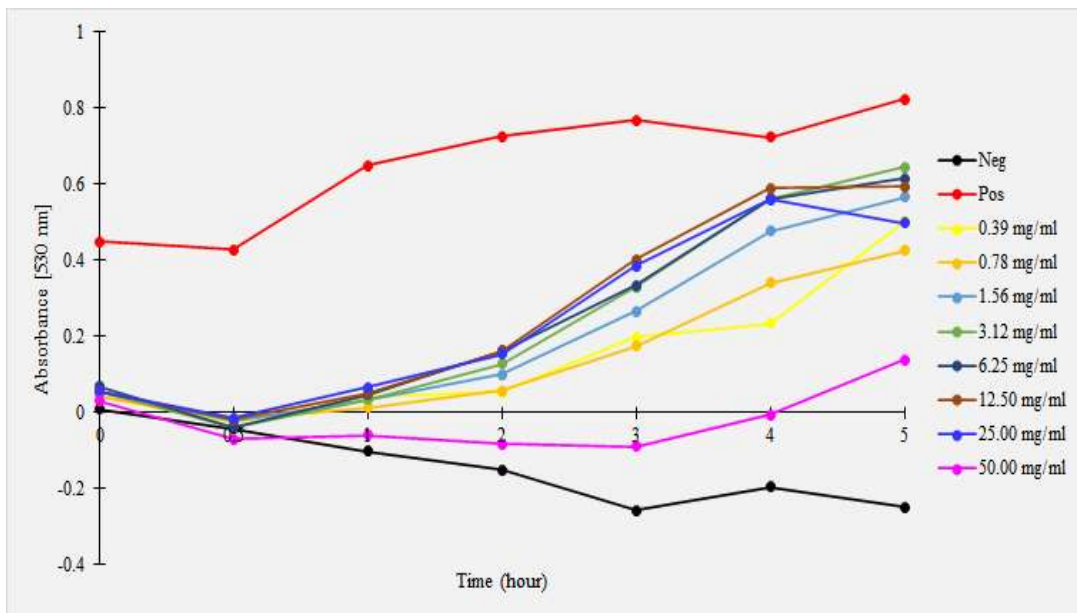
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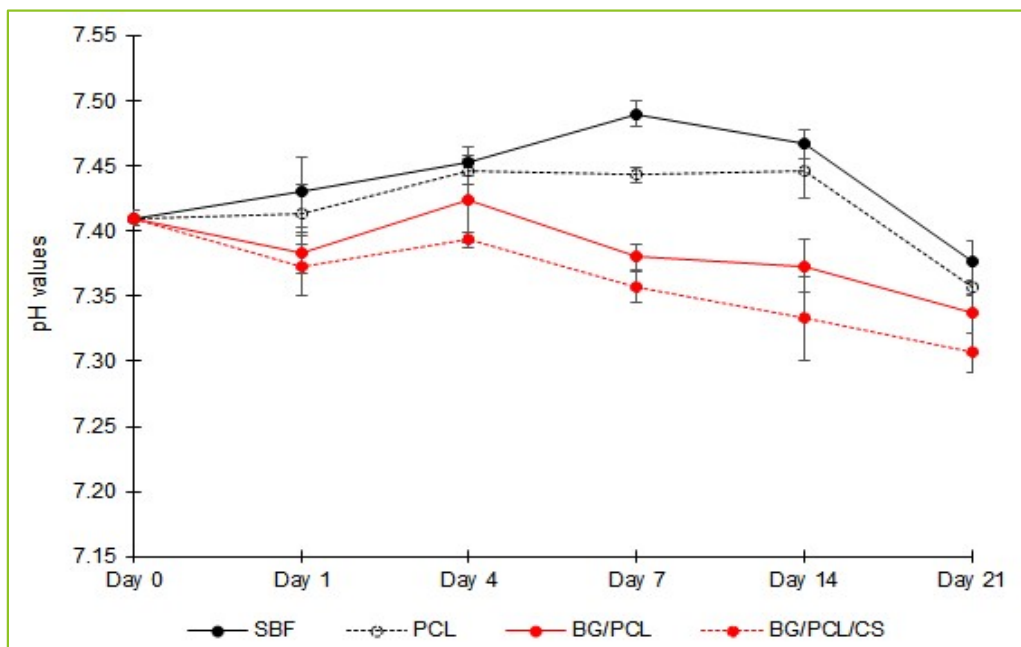
Antibacterial properties

Scientific value

- Bacteriostatic up to 4 hours which is important for wound healing and soft tissue regeneration
- Stable pH in simulated body fluids



MIC (Broth Dilution) *Staphylococcus Aureus* (SA)
(ATC 25923)



Gamma Sterilisation

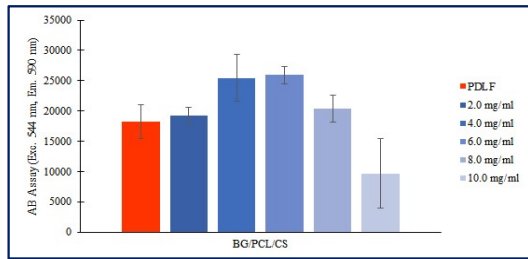
- Sterilisation through gamma irradiation at Malaysian Nuclear Agency
- Ionic elements important for skin regeneration

Element	Control	15 kGy of gamma	25 kGy of gamma	15 kGy of low EB	25 kGy of low EB
C					
O					
Na					
Si					
Ca					

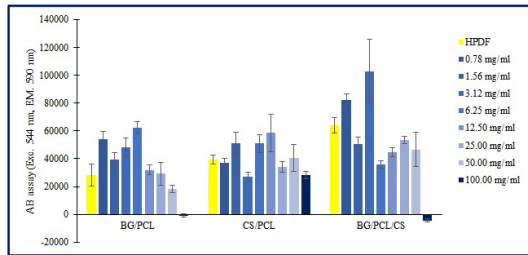


**DEMONSTRATION
IN REAL
ENVIRONMENT:
IN VITRO STUDIES**

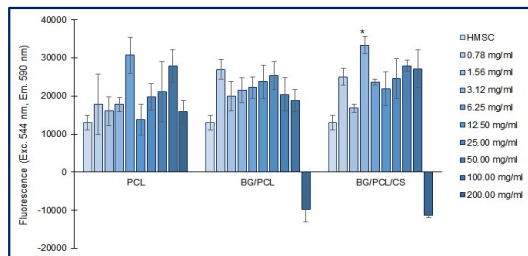
In vitro studies



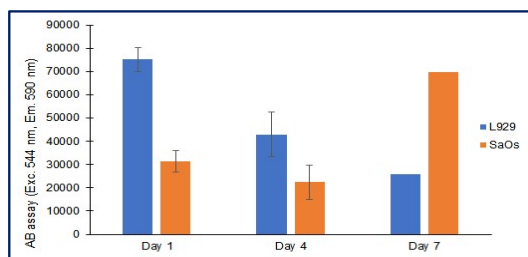
Human periodontal ligament fibroblasts



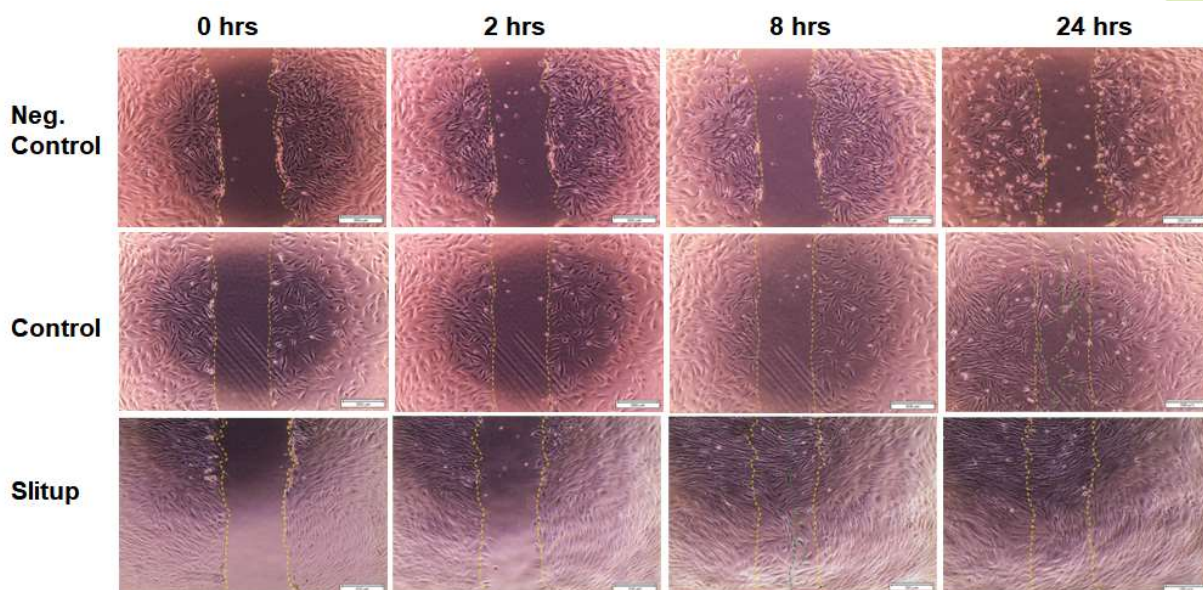
Human primary dermal fibroblasts



Human mesenchymal stem cells



L929 murine fibroblasts and SaOS-2 Human osteoblasts

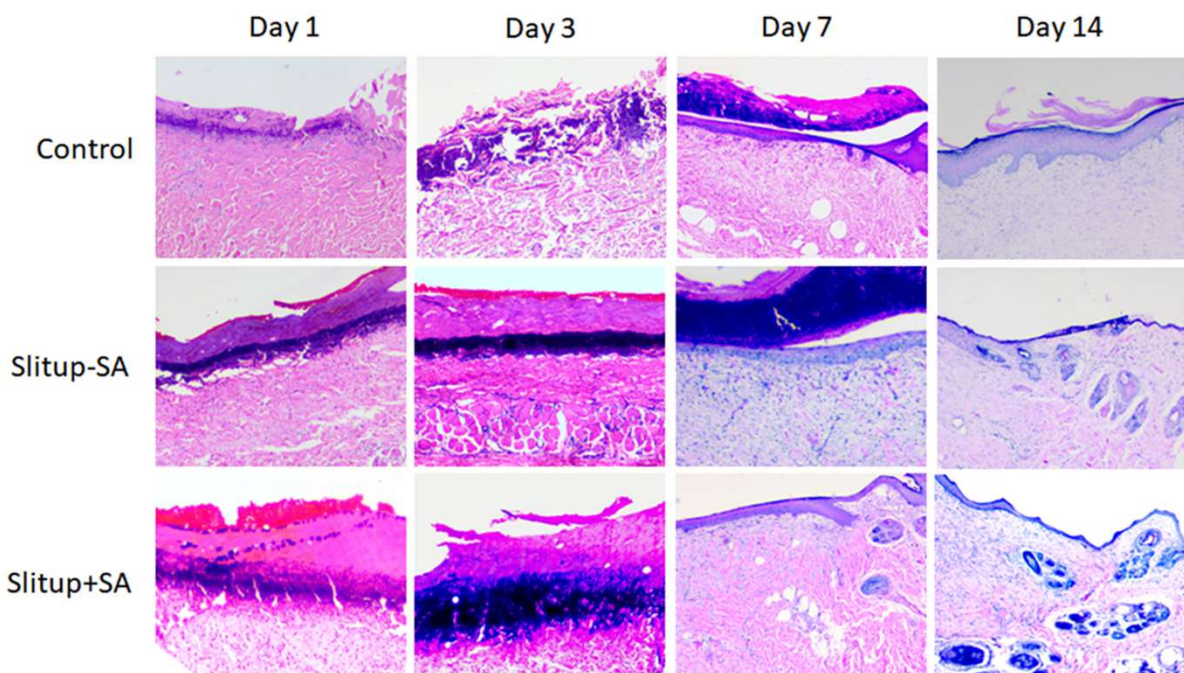
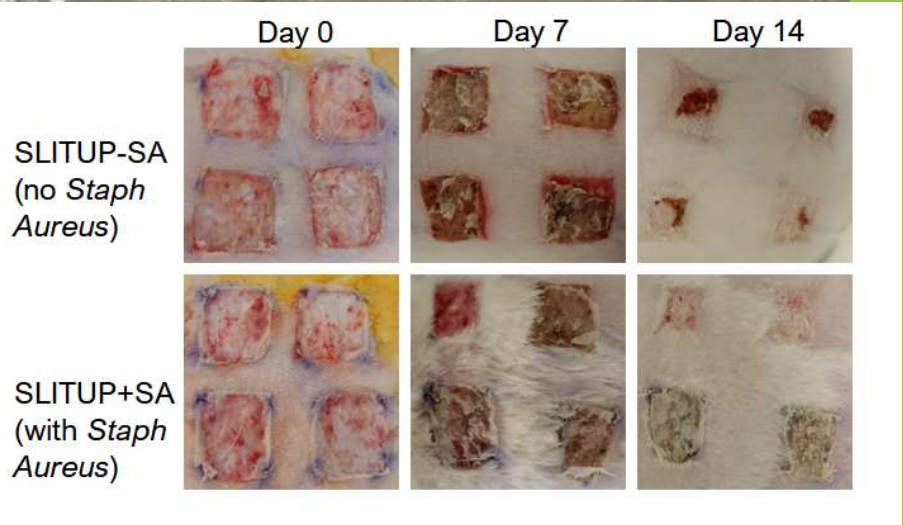
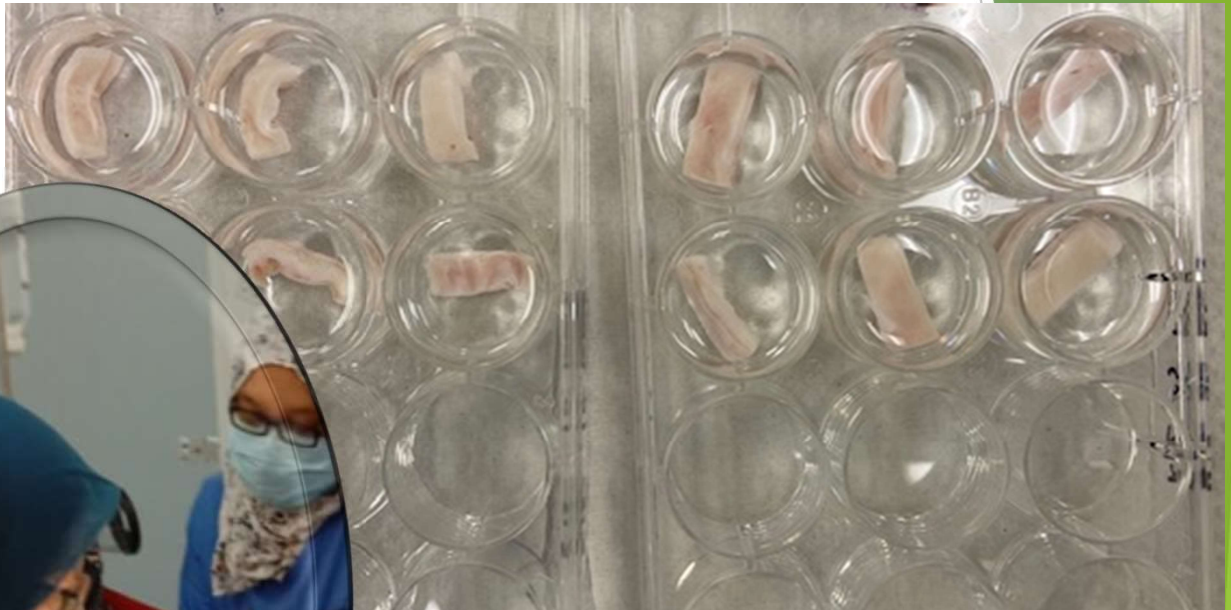


Human primary dermal fibroblasts in scratch migration assay. All magnification at 4x



**DEMONSTRATION
IN REAL
ENVIRONMENT:
IN VIVO STUDIES**

In vivo studies



Magnification 4x for all images



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Patents (5,882) = bioactive AND glass-polycaprolactone-chitosan ⊖

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Patent Records 5,882	Simple Families 1,907	Extended Families 1,631
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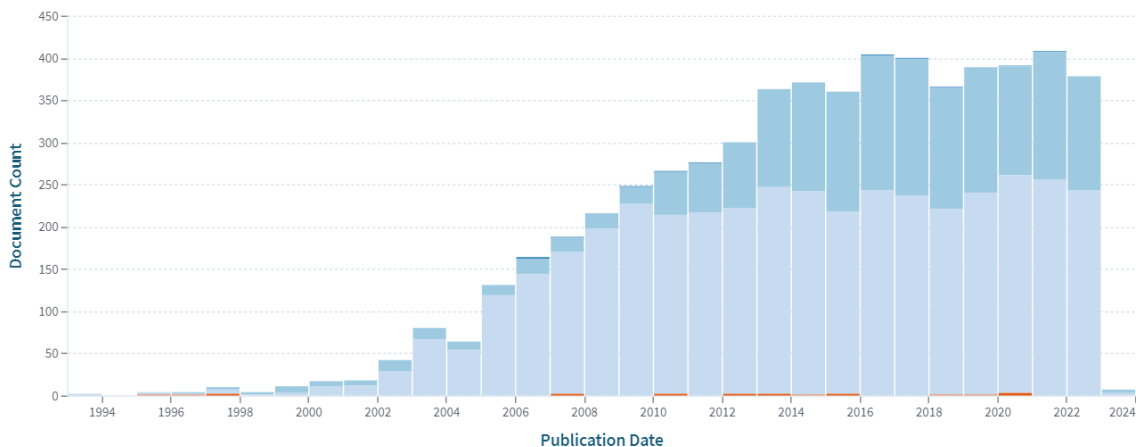
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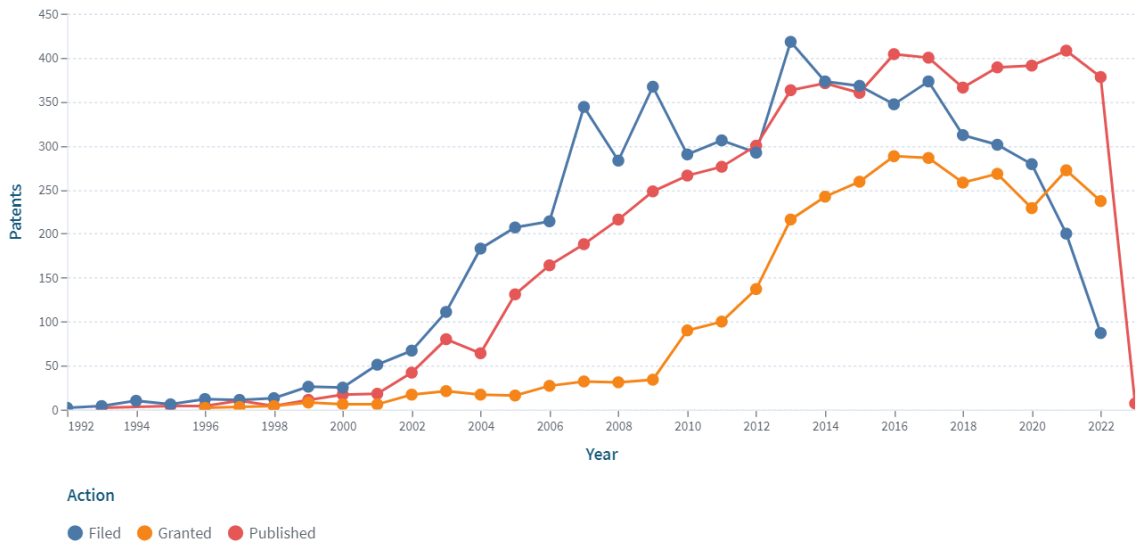


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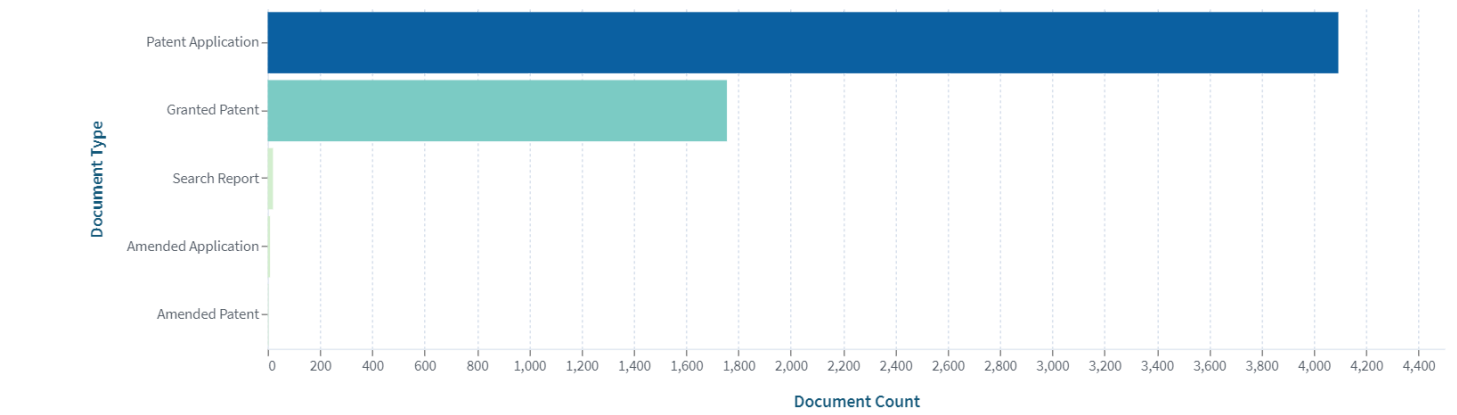
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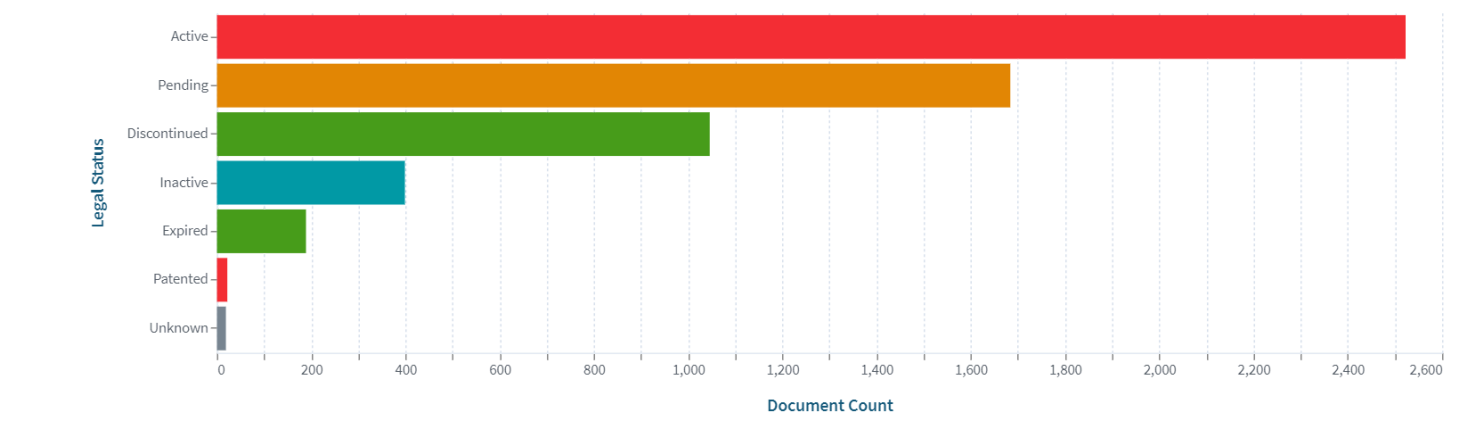
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Patent documents by Type



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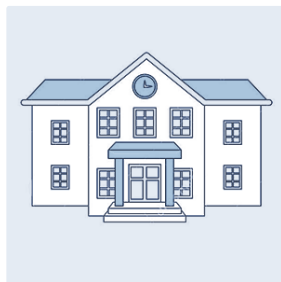
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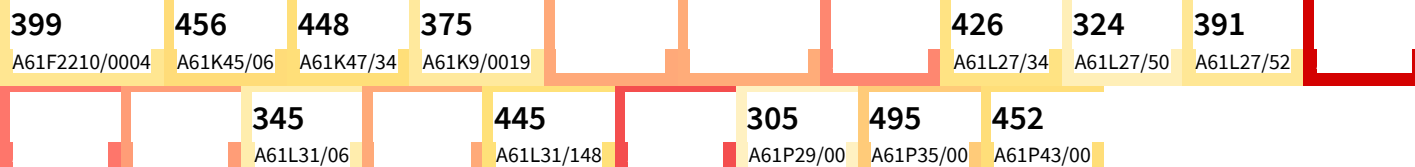
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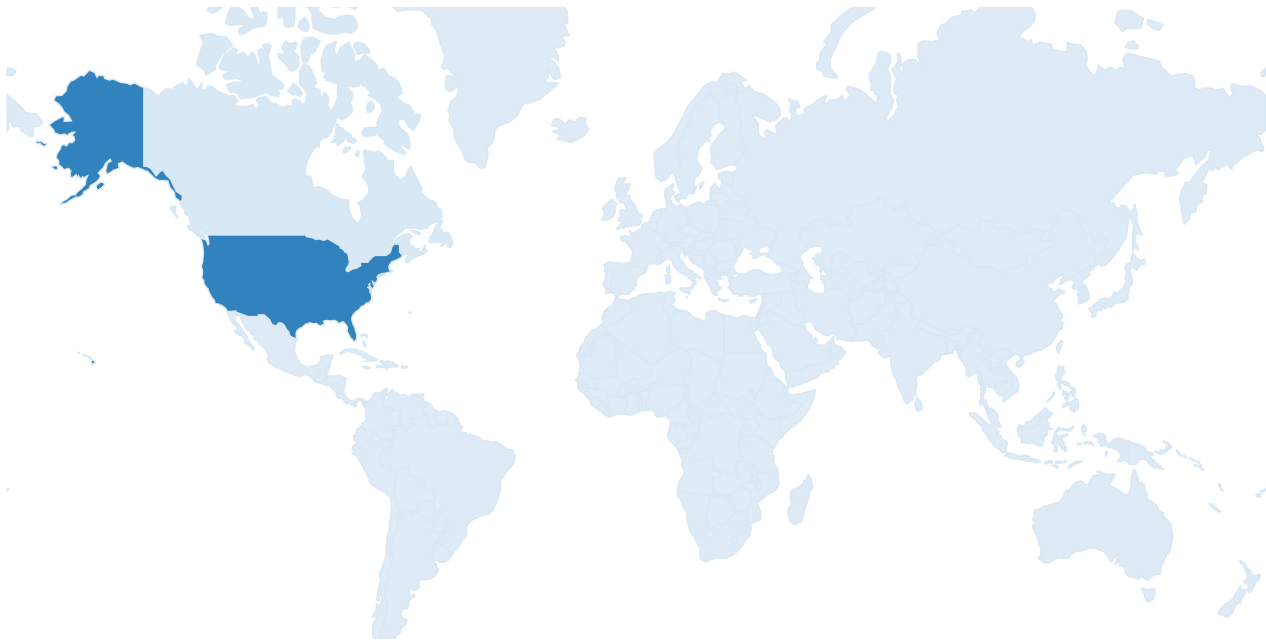
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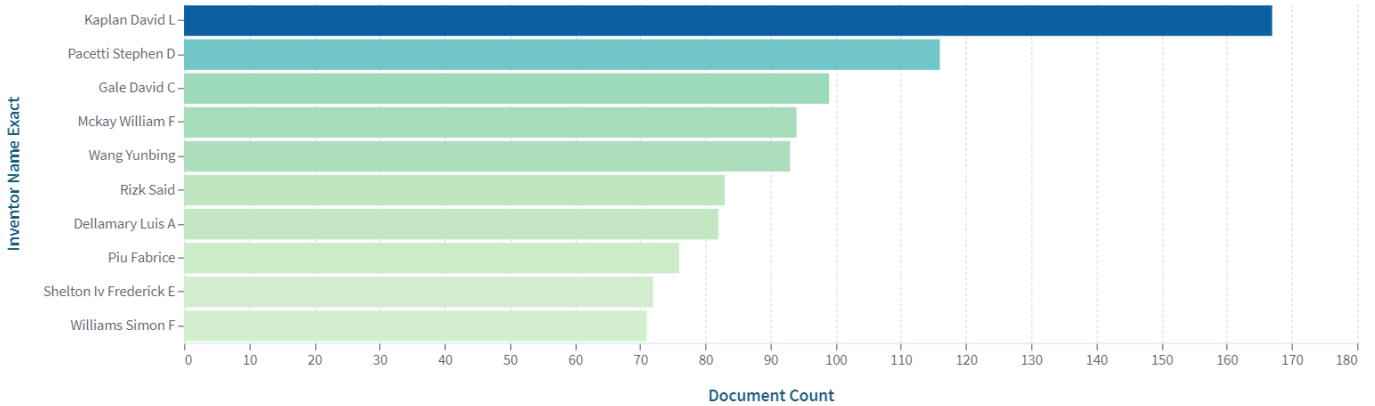
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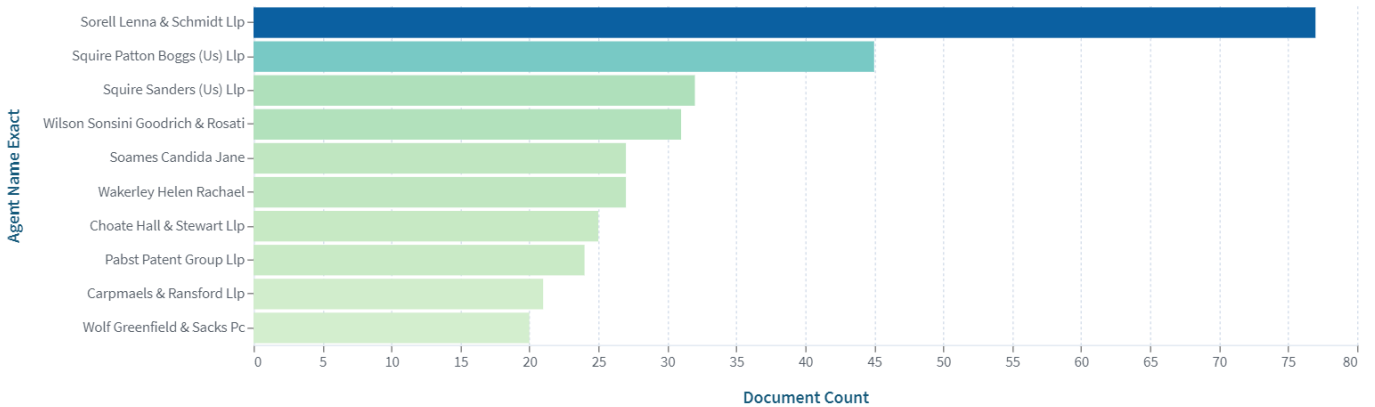
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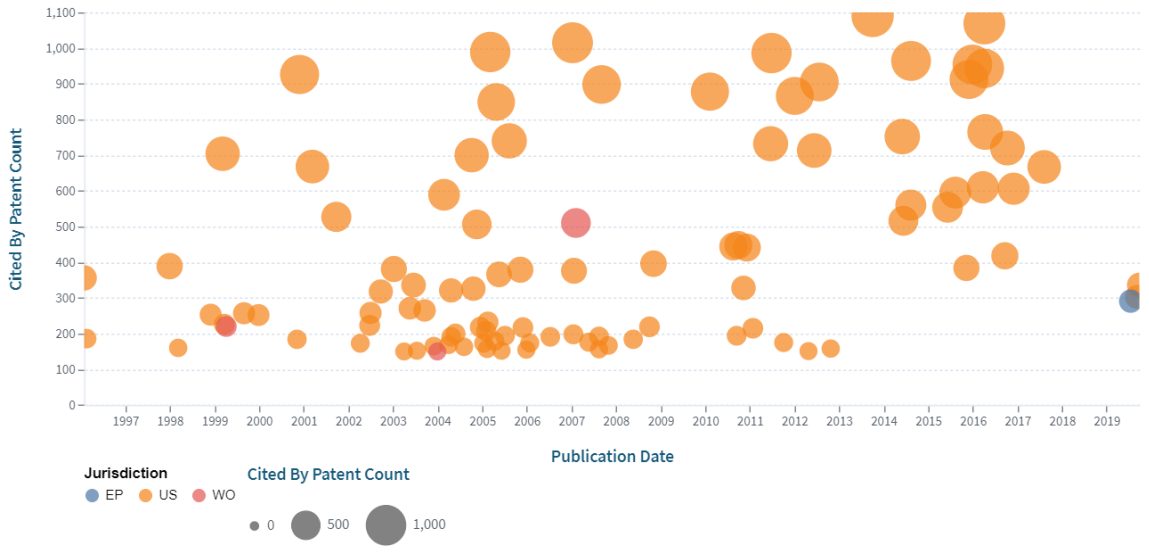
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Patents (5,882) = bioactive AND glass-polycaprolactone-chitosan ⊖

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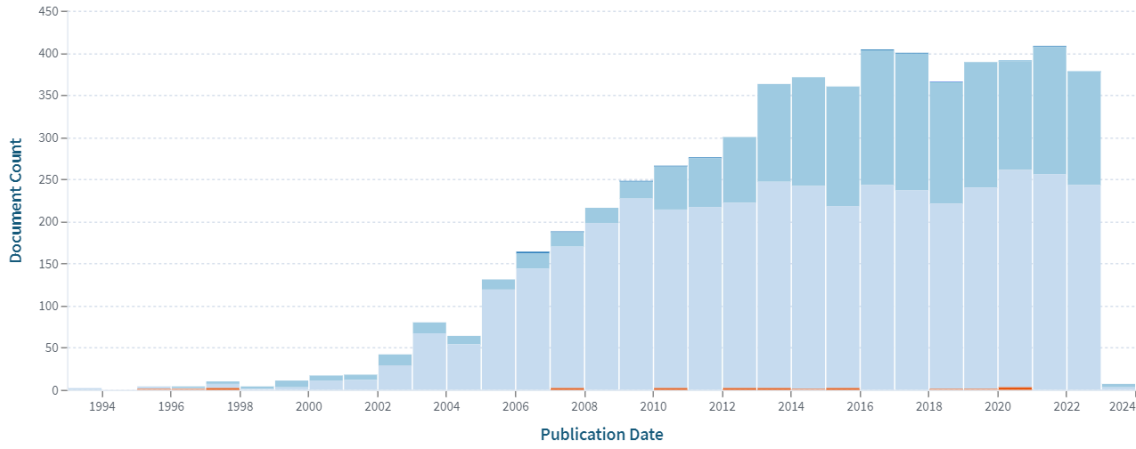
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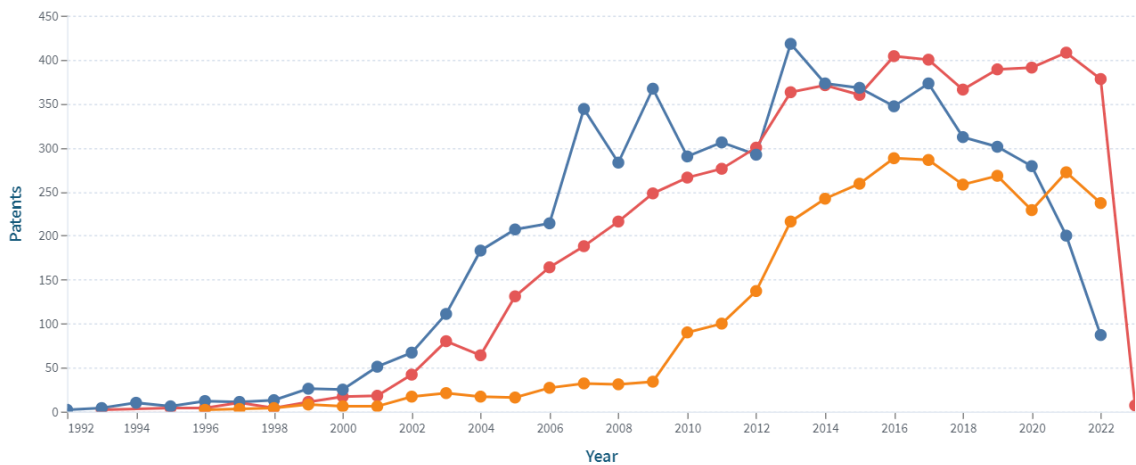


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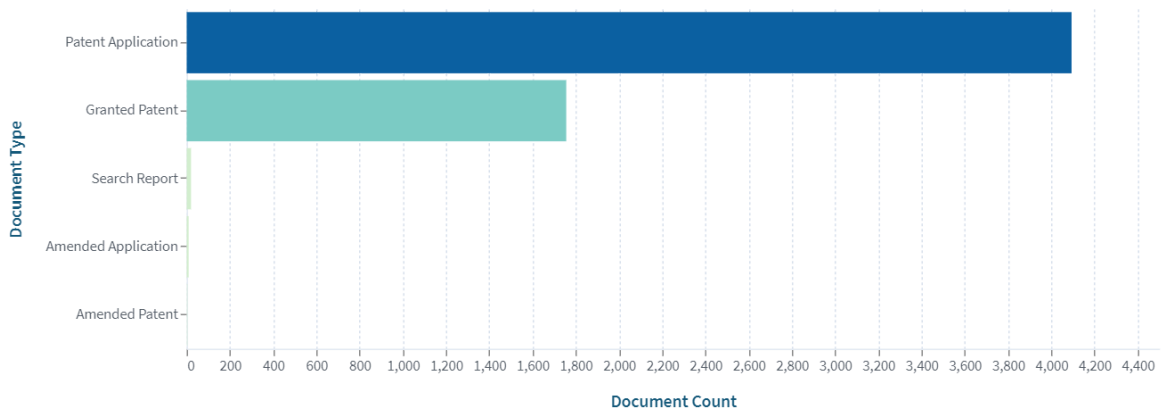


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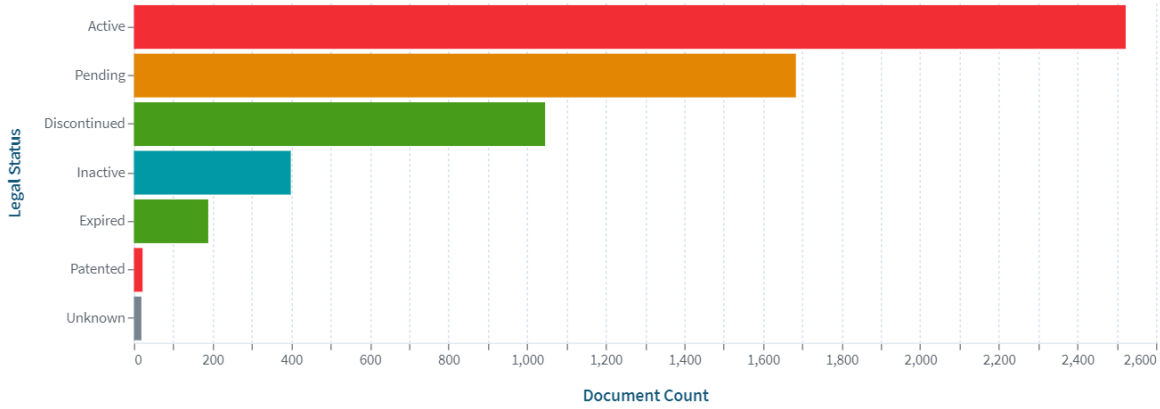
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 <p>Covidien Lp 101</p>	 <p>Advanced Cardiovascular System 89</p>	 <p>Otonomy Inc 85</p>	 <p>Massachusetts Inst Technology 72</p>	
 <p>Surmodics Inc 69</p>				



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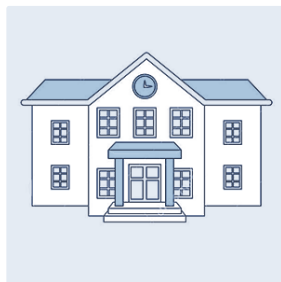
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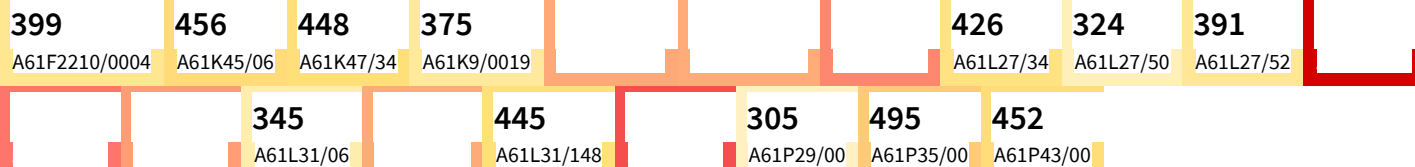
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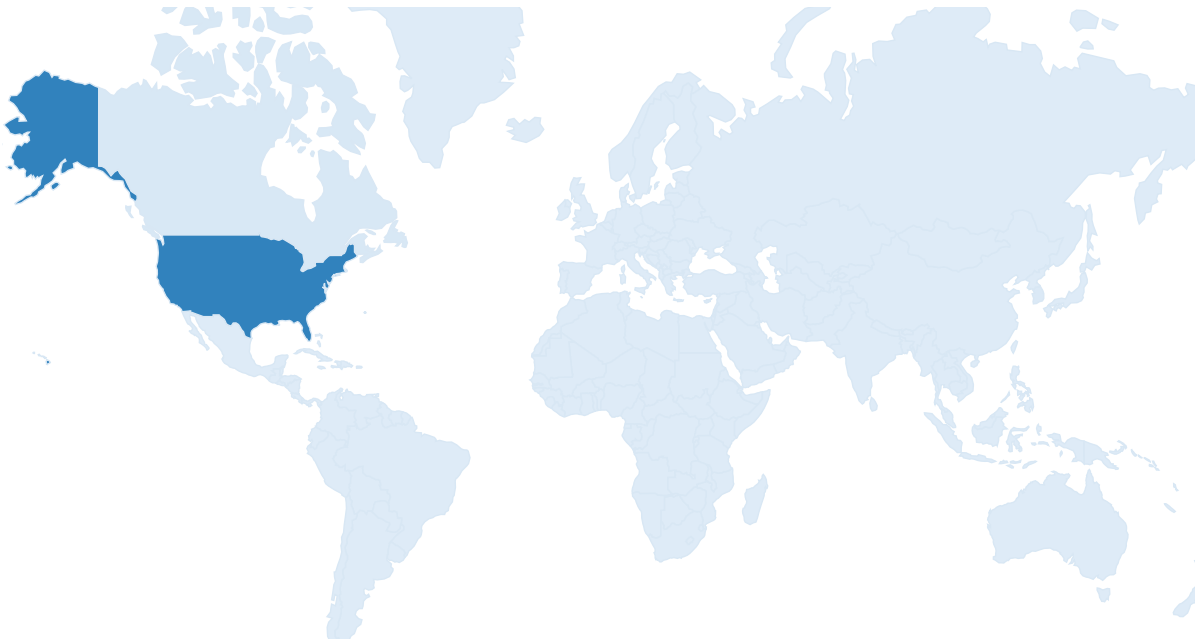
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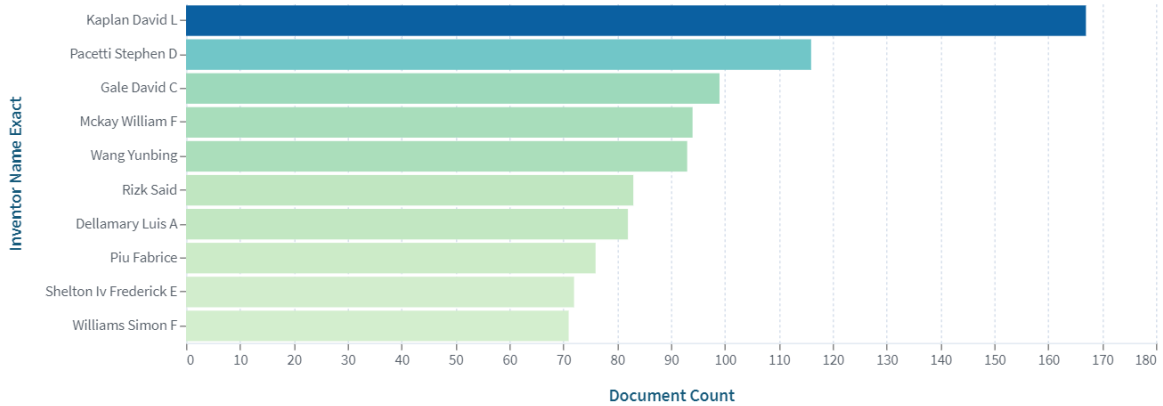
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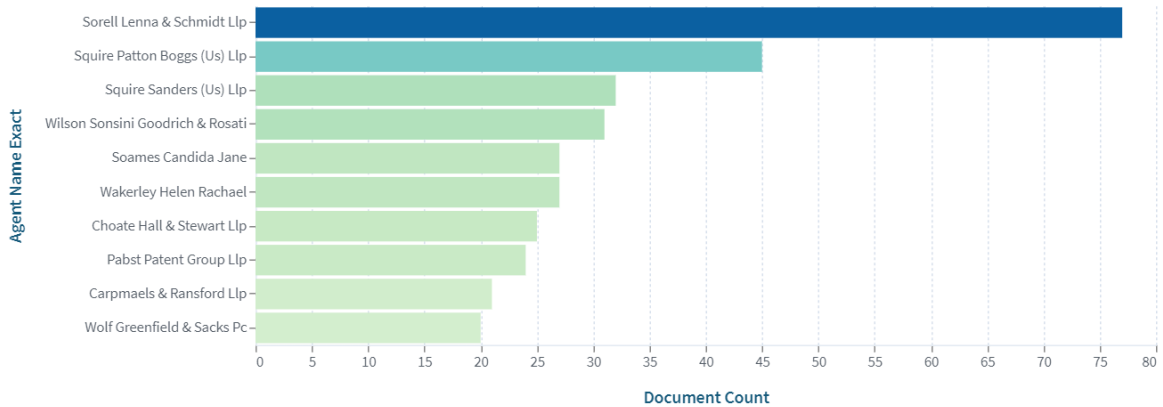
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