

PFAS und SF₆

-

Ein patentrechtlicher Überblick mit dem Fokus Recycling

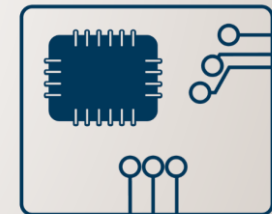
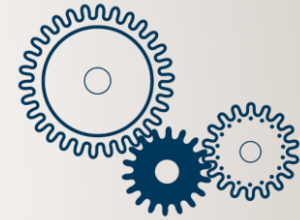
Dr. Eva Bock

Dompatent von Kreisler



dompatent von Kreisler.

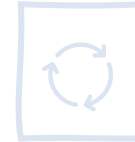
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Graduate Chemist | Dr. rer. nat. | LL.M. European Industrial and Intellectual Property Rights | Patent Attorney | European Patent and Trademark Attorney | With dompatent since 2009

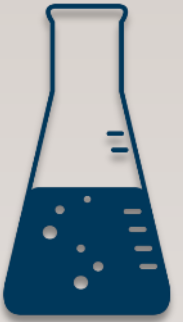
Chemistry, including inorganic and physical chemistry

Chemical engineering

Consumer goods

Material science

Patent prosecution, invalidation and litigation



PFAS und SF₆ – Knockout oder Innovationsbooster für die Energiewende



PFAS und SF₆ – Knockout oder Innovationsbooster für die Energiewende

PFAS

- Per- und polyfluorierte Alkylsubstanzen
- Wasser-, fett- und schmutzabweisend
- „Ewigkeitschemikalien“
- gesundheitsschädlich

SF₆

- Inertgas (Isolation und Lichtbogenlöschgas)
- Nicht toxisch
- Starke Treibhauswirkung (ca. 22.800 mal so stark wie CO₂)

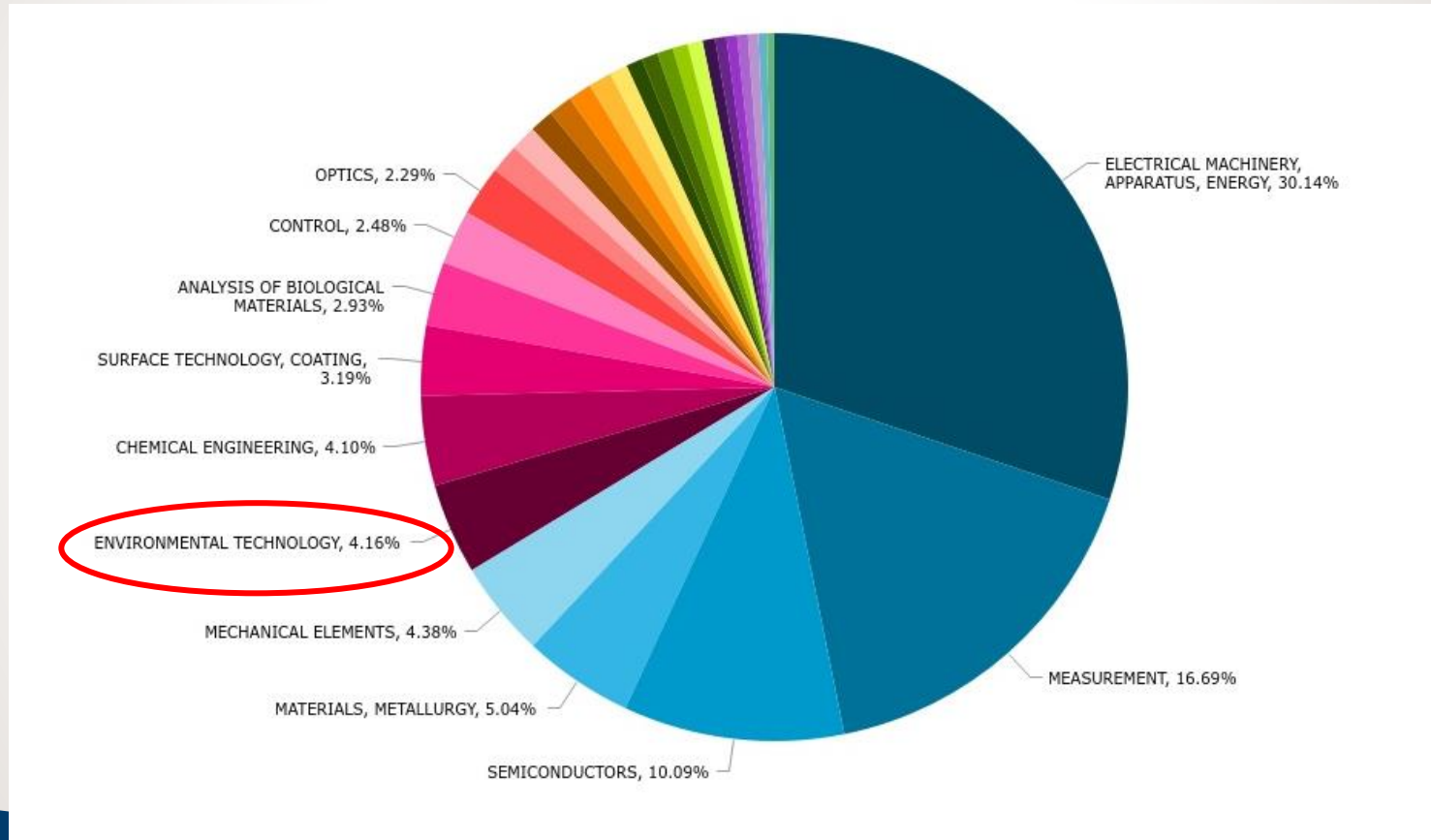


PFAS und SF₆ – Knockout oder Innovationsbooster für die Energiewende

- PFAS und SF₆ in Patentanmeldungen (Questel[®]/Orbit)
 - Patente/-anmeldungen (Familien) insgesamt: 15508
 - Patente/-anmeldungen (Familien) in den letzten 10 Jahren: 8382
 - Patente/-anmeldungen (Familien) in den letzten 5 Jahren: 4732
 - Patente/-anmeldungen (Familien) in den letzten 5 Jahren (DE, EP, WO): 347



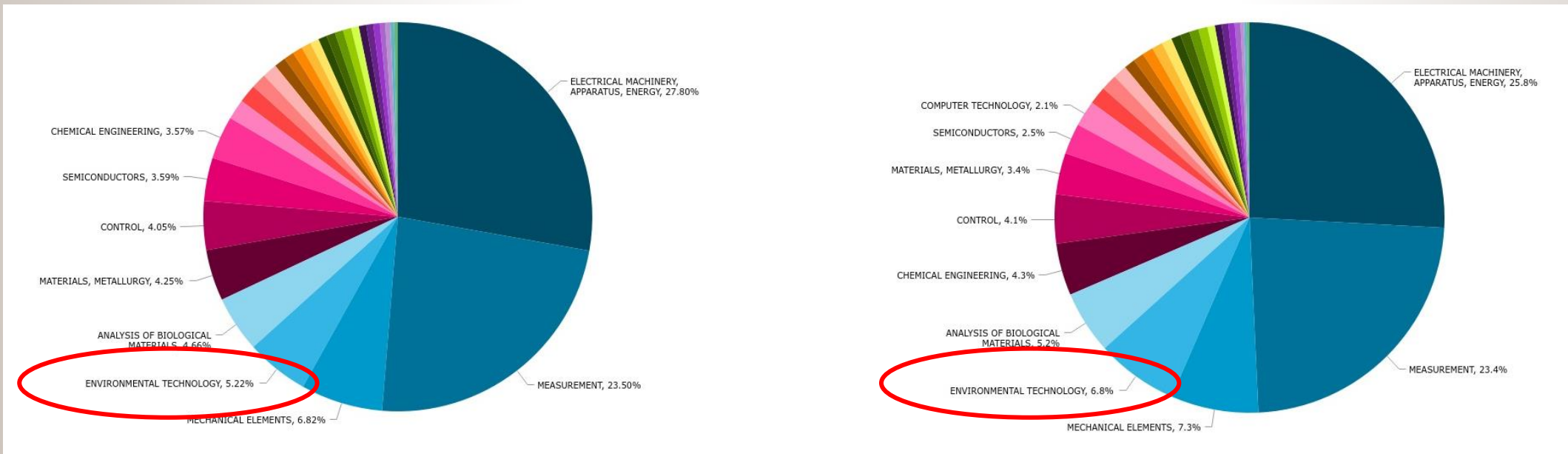
Technisches Gebiet - Umwelttechnologie



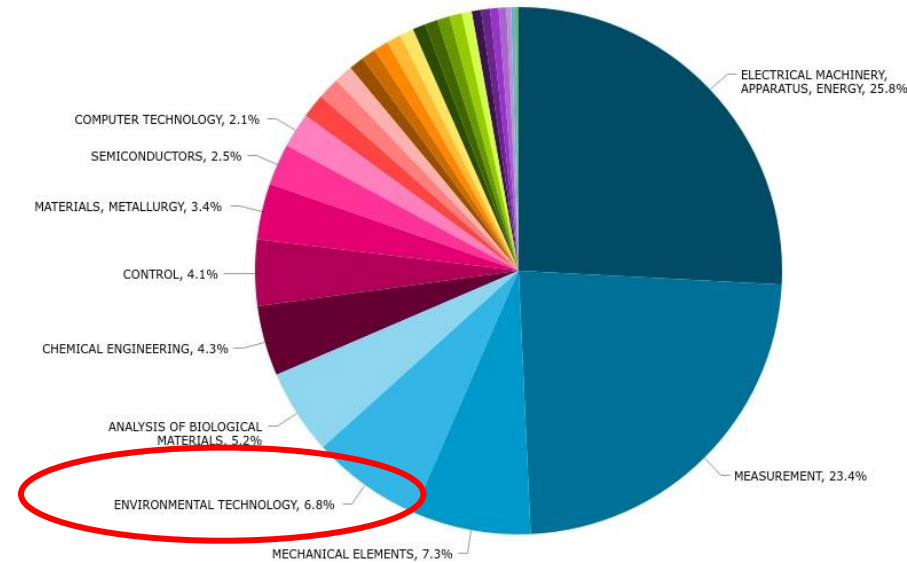
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Technisches Gebiet - Umwelttechnologie

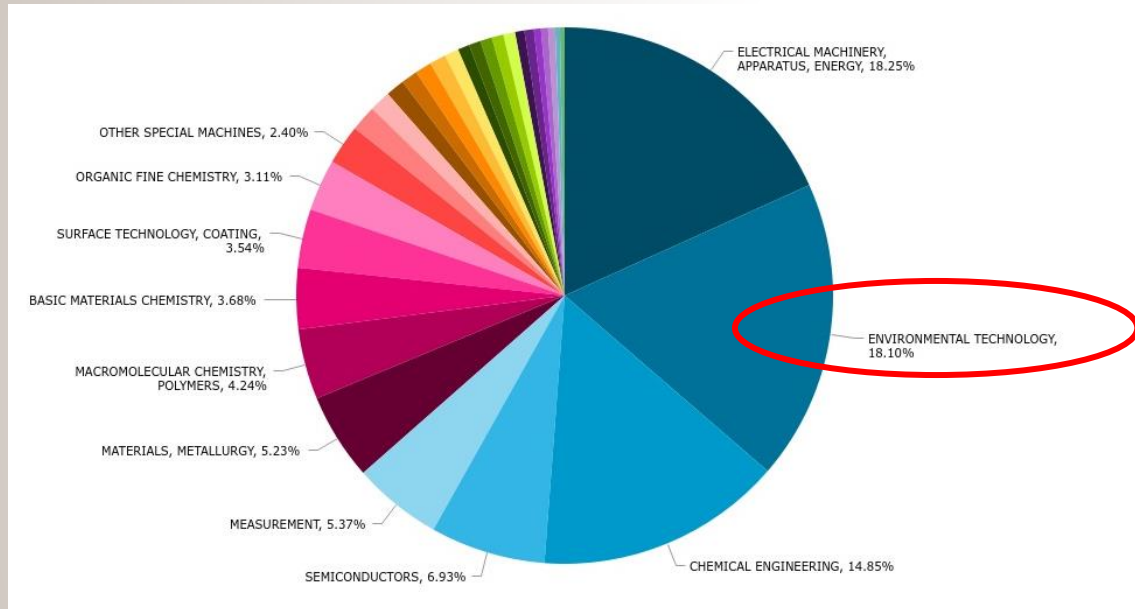
10 Jahre



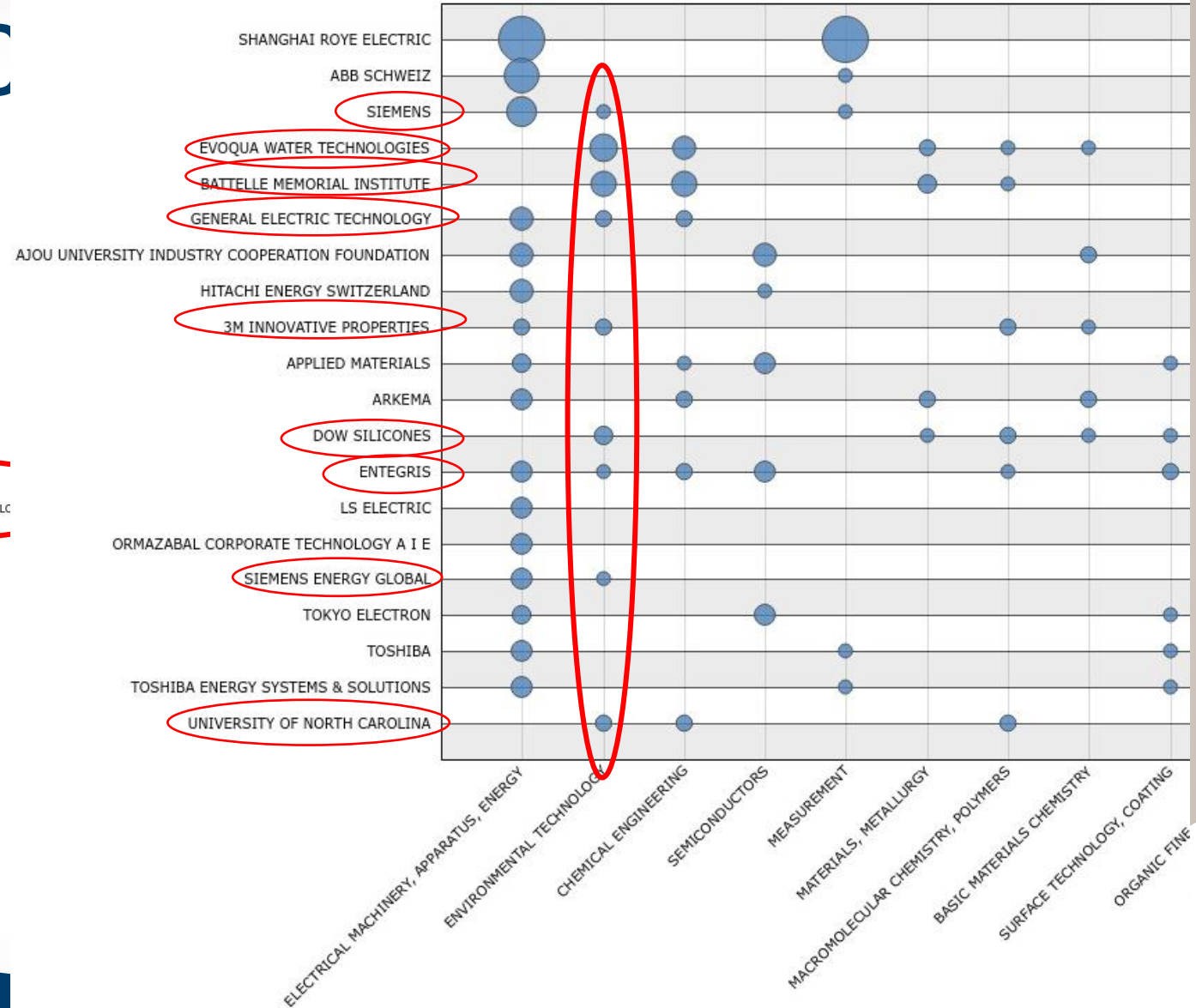
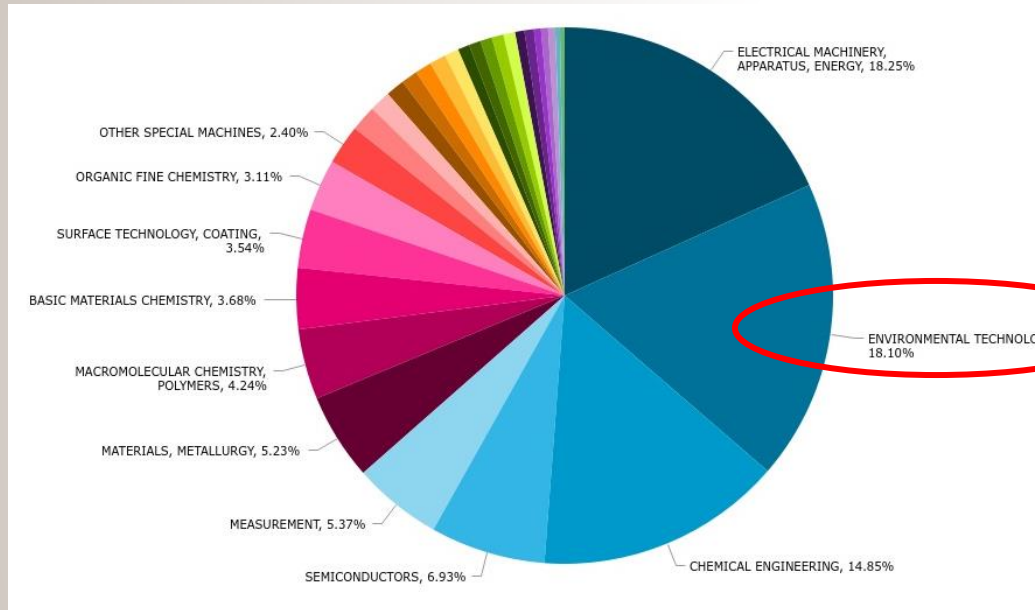
5 Jahre



Umwelttechnologie - DE, EP, WO



Umwelttechnologie - D



Und um was geht es?

Inhaltliche Schwerpunkte der Anmeldungen/Patente:

- Vermeidung und Alternativen
- Messung
- Vernichtung oder Recycling



Und um was geht es?



Und um was geht es?

- EP 3856399: Steuerung von TOC, Perchlorat und PFAS

Oxidation von fluorierten Verbindungen in einer wässrigen Lösung mit Hilfe von UV-Licht und Ionenaustauschern.

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(74) Agent: FREDERICK C., Wilkins, 10 TECHNOLOGY DRIVE, LOWELL, Massachusetts 01851 (US)

(21) International Application Number: PCT/US2019/051861
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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(84) Title: CONTROL OF TOC, PERCHLORATE, AND PFAS THROUGH ADVANCED OXIDATION AND SELECTIVE ION EXCHANGE PROCESS

FIG. 1

(57) Abstract: Systems and methods for controlling TOC, perchlorate, and/or PFAS levels in water involving an advanced oxidation process (AOP) combined with ion exchange resin are disclosed.

Und um was geht es?

• EP 4048642: Zerstörung von PFAS in Gegenwart von Siliziumdioxid

PFAS werden in wässriger Lösung mit HF-behandeltem Glas liner in Kontakt gebracht, wodurch man eine wässrige Lösung ohne PFAs erhält (keine genaueren Angaben zur Lösung)



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(74) Agent: ROSENBERG, Frank, 5737 Kanam Road, No. 190, Agoura Hills, California 91301 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW).

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(30) Priority Data: 62/926,473 26 October 2019 (26.10.2019) US

(71) Applicant: BATTELLE MEMORIAL INSTITUTE [US/US]; 505 King Ave., Columbus, Ohio 43201 (US).

(72) Inventors: DEJARME, Lindy E.; 505 King Ave., Columbus, Ohio 43201 (US). DASU, Kavitha; 6692 Rocky Ridge Drive, Powell, Ohio 43065 (US).

(54) Title: DESTRUCTION OF PFAS IN THE PRESENCE OF SILICA

Fig. 1

Und um was geht es?

- EP 4192791: Salztrennung und -zerstörung von PFAS mittels Umkehrosmose

Wässrige Lösung mit PFA werden unter Superkritischen-Wasser-Oxidationsbedingungen zerstört, bei der zunächst die PFA-Lösung mit Ionenaustauschern enthärtet wird.

Anschließend wird die PFA-Lösung über mehrere Umkehrosmose-Schritte konzentriert.

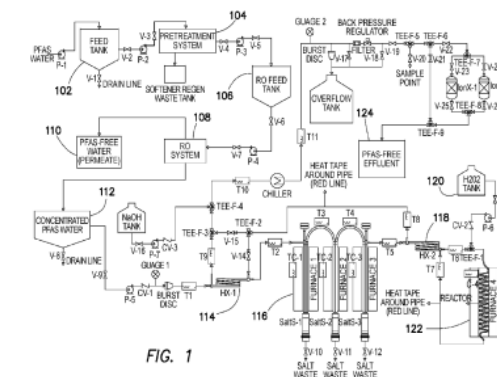
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- 25) Filing Language: English
- 26) Publication Language: English
- 30) Priority Data: 63062,251 06 August 2020 (06.08.2020) US
- 71) Applicant: **BATTELLE MEMORIAL INSTITUTE** [US/US]; Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201 (US).
- 72) Inventors: **ROSANSKY, Stephen, H.**, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201 (US). **MILLER, Michael**, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201 (US). **NORRIS, Patrick**, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201 (US). **ARGUMEDO, Darwin**, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201 (US).
- 73) **AGENT: ROSENBERG, Frank**, 5737 Kanan Rd., No. 190, Agoura Hills, California 91391 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD,

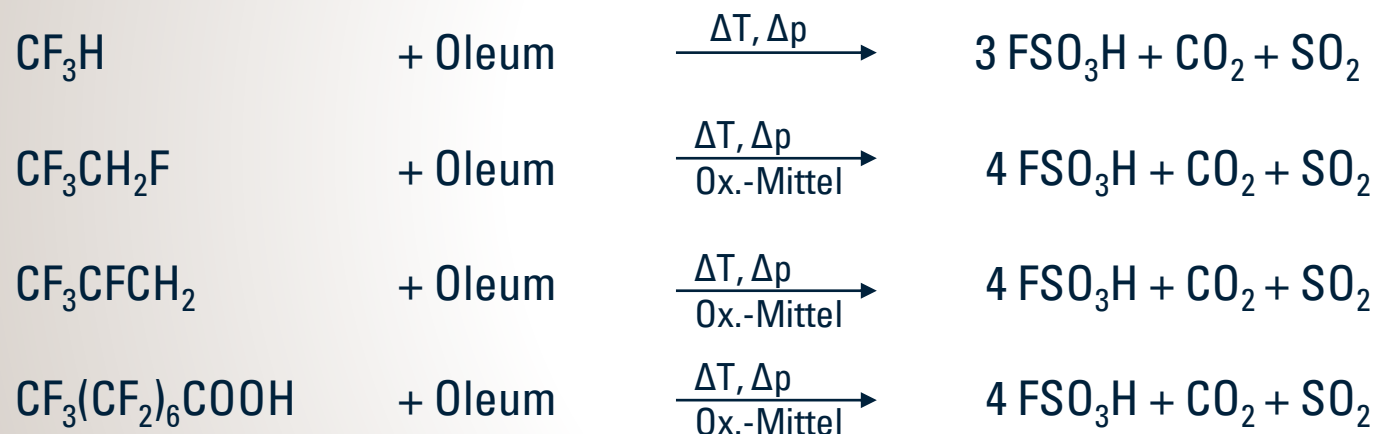
54) Title: SALT SEPARATION AND DESTRUCTION OF PFAS UTILIZING REVERSE OSMOSIS AND SALT SEPARATION



57) Abstract: Per- and polyfluoroalkyl substances (PFAS) are destroyed by oxidation in supercritical conditions. PFAS in water is concentrated in a reverse osmosis step and salt from the resulting solution is removed in supercritical conditions prior to destruction of PFAS in supercritical conditions.

Und um was geht es?

- EP 3890869: Verfahren zum Recyclen von Halogenalkanen



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(30) Priority Data:
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19159073.3 22 May 2019 (22.05.2019) EP

(71) Applicant: GRILLO-WERKE AG (DE/DE), Weseler Str. 1, 47169 Duisburg (DE)

(72) Inventors: OTT, Timo; c/o Grillo-Werke AG, Weseler Str. 1, 47169 Duisburg (DE); DIAZ-URRETIA, Christian; 5878 Glalwoods Pl, Orleans, Ontario K1W 1G6 (CA); VOGT, Matthias; c/o Grillo-Werke AG, Weseler Str. 1, 47169 Duisburg (DE)

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GL, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: METHOD FOR THE RECYCLING OR DISPOSAL OF HALOCARBONS

(57) Abstract: The present invention relates to a method for recycling and/or disposal of halocarbons, particularly fluorinated alkanes, such as trifluoroethane, by reacting said halocarbons with sulfur trioxide, particularly to form halide sulfonic acids and sulfur dioxide.

Und um was geht es?

• EP 3990399: Zerstörung von PFAS durch ein Oxidationsverfahren

Wässrige Lösung mit PFA werden unter Superkritischen-Wasser-Oxidationsbedingungen zerstört, bei der zunächst die PFA-Lösung konzentriert wird

Erwartete Oxidationsreaktion :



Auch mit Alkali-Hydroxiden beschrieben:



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(71) Applicant: **BATTELLE MEMORIAL INSTITUTE**
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(72) Inventors: **ELLIS, Jeffrey**; 1060 Bluffpoint Drive,
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BROWN, Keith; 124 Meadow Lane, Solon, Ohio 44139
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(74) Agent: **ROSENBERG, Frank**; 5737 Kanan Road, No.
 190, Agoura Hills, California 91301 (US).

(81) Designated States (unless otherwise indicated, for every
 kind of national protection available): AE, AG, AL, AM,

(54) Title: DESTRUCTION OF PFAS VIA AN OXIDATION PROCESS AND APPARATUS SUITABLE FOR TRANSPORTATION TO CONTAMINATED SITES

FIG. 6A

(57) Abstract: Per- and polyfluoroalkyl substances (PFAS) are destroyed by oxidation in supercritical conditions. PFAS in water can be concentrated and prepared for destruction in a pretreatment phase. Following annihilation of the PFAS in supercritical conditions to levels below 5 parts per trillion (ppt), the water effluent can be used to recover heat, returned to sub-critical conditions, and then released back into the environment.

Und um was geht es?

- EP 4090630: Fluorkohlenstoffzerstörungssystem und -verfahren

Elektrolyse wässriger PFA-Lösungen mit Hilfe eines Elektrolyseharzes unter Anlegung einer Spannung zu CO₂ und Fluorid.

Das Elektrolyseharz ist ein Ionenaustauscher, der regeneriert werden kann.

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(72) Inventors: FELCH, Chad L.; 1862 Mike Lane, Kronenwetter, Wisconsin 54455 (US). BURCLAFF, Philip A.; 5121 Pine Street, Weston, Wisconsin 54476 (US).

(74) Agent: OTTERLEE, Thomas J.; Siemens Energy, Inc.-Intellectual Property Dept., 3850 Quadrangle Blvd., Orlando, Florida 32817 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

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(71) Applicant: SIEMENS ENERGY, INC. [US/US]; 4400 N Alafaya Trail, Orlando, Florida 32826 (US).

(54) Title: FLUOROCARBON DESTRUCTION SYSTEM AND METHOD

FIG. 1

(57) Abstract: A method of destroying a fluorocarbon compound includes regenerating an adsorbent to remove the fluorocarbon compound and to produce a regeneration fluid having a concentration of the fluorocarbon compound and directing the regeneration fluid to an electro-oxidation system. The method also includes applying a current to the electro-oxidation system to oxidize the fluorocarbon compound within the regeneration fluid and measuring a quantity of fluorides in the regeneration fluid to determine the progress of the removal of the fluorocarbon compound from the regeneration fluid.

Und um was geht es?

- EP 4188968: Verfahren zur Entfernung von fluororganischen Verbindungen aus Emulsionen

Entfernung von fluororganischen sauren Verbindungen aus einer Lösung, die fluororganische Polymerteilchen enthält.

Dabei wird mit Hilfe eines Amins das Salz der sauren Verbindungen hergestellt und mittels Extraktion getrennt.

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(71) Applicant: 3M INNOVATIVE PROPERTIES COMPANY [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

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(54) Title: PROCESS FOR REMOVAL OF FLUOROORGANIC COMPOUNDS FROM EMULSIONS

(57) Abstract: The present disclosure provides a process for removing fluororganic acidic compounds from an emulsion of fluororganic polymer particles, the process comprising the following steps: (i) forming a mixture of a, an emulsion comprising fluororganic polymer particles, at least one fluororganic acidic compound and at least one protic solvent, with b, at least one alkylamine; (ii) reacting the fluororganic acidic compound with the alkylamine to form a hydrophobic ionic compound comprising the anion of the fluororganic acidic compound and the cation of the alkylamine; (iii) separating the mixture into a first phase comprising the at least one protic solvent and no greater than 80 % by weight, preferably no greater than 50% by weight of the total amount of the at least one fluororganic acidic compound initially present in the solution in step (i); and a second phase comprising the hydrophobic ionic compound; (iva) removing the first phase from the second phase; and then (va) removing the fluororganic polymer particles from the second phase and/or the first phase, or (ivb) removing the fluororganic polymer particles from the second phase and/or the first phase, and then (vb) removing the first phase from the second phase.

Und jetzt?

- Alternativen gibt es und werden entwickelt
- Beim Recycling werden viele Möglichkeiten erprobt. Ein etabliertes Verfahren neben der Verbrennung scheint es (noch) nicht zu geben.
- Weiter Einschränkungen/Verbot in politischer Diskussion



Vielen Dank für Ihre
Aufmerksamkeit.

Haben Sie noch Fragen?
Kontaktieren Sie uns.

