

SEARCH RECORD

Title of invention: P-I-N PHOTODETECTOR		
Application No: PCT/FI2019/050849		
Priority application No:		
Priority number	Date	Country
1819524.8	30.11.2018	GB

Minimum documentation searched (classification system followed by classification):
IPC, CPC: H01L

Documentation searched other than minimum (FI,SE,NO,DK):
IPC: H01L31/105, H01L31/0224, H01L31/112, H01L51/42, H01L51/44, H01L27/144

Electronic data bases consulted during the novelty search:
EPODOC, EPO-Internal full-text databases, Full-text translation databases from Asian languages, WPIAP, XP3GPP, XPAIP, XPESP, XPETSI, XPI3E, XPIEE, XPIETF, XPIOP, XPIPCOM, XPJPEG, XPMISC, XPOAC, XPRD, XPTK, BIOSIS, COMPDX, EMBASE, INSPEC, MEDLINE, TDB, NPL

Language(s) in which the search was carried out:
English

Examiners consulted:
Verifying examiner Esa Tiiliharju

Date	Examiner
04.02.2020	Teppo Häyrynen

The listing of the search history:

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? ..SetDossier PCTFI2019050849 P-I-N PHOTODETECTOR
? ..FI $ABSTRACT
? /PA EMBERION
** SS 1: Results 77
? 1 AND P_I_N
** SS 2: Results 0
? 1 AND INTRINSIC+
** SS 3: Results 0
? 1 AND AMBIPOLAR+
** SS 4: Results 4
? 1 AND UNIPOLAR+
** SS 5: Results 0
? 1 AND PHOTO_TRANSISTOR+
** SS 6: Results 1
? ..v
? 1 AND (OR PHOTO_DETECTOR+, PHOTO_SENSOR+)
** SS 7: Results 21
? 1 AND GRAPHENE+
** SS 8: Results 21
? /PN US8803128
** SS 9: Results 2
? ..v
? /PN WO2019068814
** SS 10: Results 2
? ..v
? /PN WO2019020871
** SS 11: Results 2
? ..v
? /PN WO2019020869
** SS 12: Results 2
? ..v
? /IN (BESSONOV 1D ALEXANDER)
** SS 13: Results 80
? /IN (BESSONOV 1W ALEXANDER)
** SS 14: Results 76
? /IN (ALLEN 1D MARK)
** SS 15: Results 3.638
? 13 AND 15
** SS 16: Results 22
? 15 AND (OR PHOTO_DETECTOR+, PHOTO_SENSOR+)
** SS 17: Results 20
? P_I_N_PHOTO_DETECTOR+
** SS 18: Results 192
? 18 AND (OR TWO_DIMENSIONAL_MATERIAL+, 2D_MATERIAL+)
** SS 19: Results 0
? 18 AND (GRAPHENE+)
** SS 20: Results 1
? 18 AND CHARGE_ACCUMUL+
** SS 21: Results 0
? 18 AND VOLTAGE_MODE+
** SS 22: Results 0
? 18 AND PHOTO_TRANSISTOR+
** SS 23: Results 1
? 18 AND PHOTO_ACTIVE+
** SS 24: Results 0
? 18 AND AMBI_POLAR+
** SS 25: Results 0
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? 18 AND UNI_POLAR+
** SS 26: Results 0
? 18 AND INTRINSIC+
** SS 27: Results 58
? /PN US5567971
** SS 28: Results 2
? /PN US2016035794
** SS 29: Results 2
? ..v
? /PN EP3144980
** SS 30: Results 2
? ..v
? /PN US20160359062
** SS 31: Results 0
? /PN US2016359062
** SS 32: Results 2
? ..v
? PN PCTFI20176109
** SS 33: Results 0
? PN PCT20176109
** SS 34: Results 0
? PN FI20176109
** SS 35: Results 0
? LOGON
? ..FI \$ABSTRACT
? (AND H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW)
** SS 1: Results 0
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW)
** SS 2: Results 286.130
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND PHOTO_ACTIVE+
** SS 3: Results 3.083
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND PHOTO_ACTIVE+, HETERO_JUNCTION+)
** SS 4: Results 332
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND PHOTO_ACTIVE+, HETERO_JUNCTION+, P_I_N)
** SS 5: Results 1
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (P_I_N)
** SS 6: Results 3.171
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+))
** SS 7: Results 492
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), GRAPHENE+)
** SS 8: Results 5
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), TWO_DIMENSIONAL_MATERIAL+)
** SS 9: Results 0
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), TWO_DIMENSIONAL+)
** SS 10: Results 9
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW,

H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), 2D_MATERIAL+)

** SS 11: Results 0
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), PHOTO_ACTIVE+)

** SS 12: Results 6
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), NANO_CRYSTAL+)

** SS 13: Results 1
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, (OR PHOTO_DETECTOR+, PHOTO_SENSOR+), NANO_PARTICLE+)

** SS 14: Results 3
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND P_I_N, PHOTO_TRANSISTOR+)

** SS 15: Results 24
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND PHOTO_ACTIVE+, HETERO_JUNCTION+, PHOTO_TRANSISTOR+)

** SS 16: Results 2
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND PHOTO_ACTIVE+, HETERO_JUNCTION+, NANO_CRYSTAL+)

** SS 17: Results 7
? (OR H01L51/42/C/IC/LOW, H01L31/105/C/IC/LOW, H01L31/0224/C/IC/LOW, H01L51/44/C/IC/LOW, H01L27/144/C/IC/LOW, H01L31/112/C/IC/LOW) AND (AND PHOTO_ACTIVE+, HETERO_JUNCTION+, NANO_PARTICLE+)

** SS 18: Results 15
? P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+

** SS 19: Results 198
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (5UG (OR STACK, MULTI+, SEVERAL), PHOTO_ACTIVE+, LAYER+)

** SS 20: Results 55
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+)

** SS 21: Results 134
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+) AND (INFRA_RED+)

** SS 22: Results 8
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_NTO_SENSOR+)

** SS 23: Results 0
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_DETECTOR+ OR P_I_N_SENSOR+)

** SS 24: Results 80
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+) AND (OR NANO_CRYSTAL+, NANO_PARTICLE+, QUANTUM_DOT+)

** SS 25: Results 0
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+) AND (GRAPHENE+)

** SS 26: Results 1
? ..v
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+) AND (CHARGE_ACCUM+)

** SS 27: Results 0
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR P_I_N_PHOTO_SENSOR+) AND (OR TWO_DIMENSIONAL+, 2D_MATERIAL+)

** SS 28: Results 2
? P_I_N_PHOTO_DETECTOR+

SEARCH RECORD

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** SS 29: Results 192
? P_I_N_DETECTOR+
** SS 30: Results 350
? P_I_N_PHOTO_SENSOR+
** SS 31: Results 8
? P_I_N_SENSOR+
** SS 32: Results 383
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_PHOTO_DETECTOR+ OR
P_I_N_PHOTO_SENSOR+)
** SS 33: Results 134
? (OR H01L51/C/IC/LOW, H01L31/C/IC/LOW, H01L27/C/IC/LOW) AND (P_I_N_DETECTOR+ OR
P_I_N_SENSOR+)
** SS 34: Results 80
? (OR P_I_N_PHOTO_DETECTOR+, P_I_N_PHOTO_SENSOR+, P_I_N_DETECTOR+, P_I_N_SENSOR+)
** SS 35: Results 926
? 35 AND (OR NANO_CRYSTAL+, NANO_PARTICLE+, QUANTUM_DOT+)
** SS 36: Results 1
? 35 AND (CRYSTALLINE_CHANNEL+)
** SS 37: Results 0
? 35 AND (AMORPHOUS_CHANNEL+)
** SS 38: Results 0
? 35 AND (PHOTO_ACTIVE_LAYER+)
** SS 39: Results 0
? 35 AND (TRANSISTOR+)
** SS 40: Results 26
? 35 AND (VOLTAGE_MODE+)
** SS 41: Results 0
? 35 AND CHARGE_ACCUM+
** SS 42: Results 0
? P_I_N_ABSORBER+
** SS 43: Results 1
? P_I_N_CHANNEL+
** SS 44: Results 669
? P_I_N_CHANNEL+ AND PHOTO_TRANSISTOR+
** SS 45: Results 0
? P_I_N_CHANNEL+ AND VOLTAGE_MODE+
** SS 46: Results 0
? P_I_N_CHANNEL+ AND (OR DETECTOR+, SENSOR+)
** SS 47: Results 18
? P_I_N_CHANNEL+ AND (OR PHOTO_DETECTOR+, PHOTO_SENSOR+)
** SS 48: Results 0
? P_I_N_HETERO_JUNCTION+
** SS 49: Results 78
? LOGON
? ..FI $ABSTRACT
? /PN US2017236957
** SS 1: Results 2
? LOGON
? ..FI $ABSTRACT
? ..SKANDI
? ..FI EPODOC
? ..NOLIM
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(PD>=1959 AND PD<=1968))) OR ((H01L31/105 OR H01L31/0224 OR H01L31/112 OR H01L51/42 OR
H01L51/44 OR H01L27/144) /ICA/IC.FLD)
** SS 1: Results 58.004
? * AND SE/PN {All SE documents}
** SS 2: Results 40
? *1 AND DK/PN {All DK documents}
** SS 3: Results 140
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? *2 AND NO/PN {All NO documents}
** SS 4: Results 23
? *3 AND FI/PN {All FI documents}
** SS 5: Results 11
? *3 OR *2 OR *1 OR *
** SS 6: Results 214
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? ..FI WPIAP
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** SS 2: Results 372
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? ..FI EPODOC
? *XT
** SS 7: Results 833
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** SS 8: Results 57
? * AND SE/PN {Filtered SE documents}
** SS 9: Results 1
? *1 AND DK/PN {Filtered DK documents}
** SS 10: Results 54
? *2 AND NO/PN {Filtered NO documents}
** SS 11: Results 2
? *3 AND FI/PN {Filtered FI documents}
** SS 12: Results 0
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? XFull Fulltext Patent Search:

Mode Direct (Patent Search)

English query concept 1: 'or p_i_n_photo_detector+, p_i_n_photo_sensor+, p_i_n_detector+, p_i_n_sensor+'

concept 2: 'or nano_crystal+, nano_particle+, quantum_dot+'

concept 3: 'or p_i_n_hetero_junction+, p_i_n_channel+, p_i_n_absorber+'

concept 4: 'or two_dimensional_material+, 2D_material+, graphene+'

concept 5: 'or charge_accumul+, voltage_mode+'

concept 6: 'photo_transistor+'

concept 7: 'or photo_active_layer+, measurement_layer+, intrinsic_semiconduct+_layer+'

concept 8: 'or ambipolar+, unipolar+'

concept 9: 'or crystalline_channel+, amorphous_channel+'

English cluster: 'TCM TXPCNEA TXPCNEB TXPCNEC TXPCNEU TXPCNEY TXPEA TXPEB TXPEC TXPEE

TXPEF TXPEH TXPEI TXPEP TXPEPEA TXPEPEB TXPEF TXPEU TXPEY TXPJPEA TXPJPEB TXPJPOEA

TXPJPOEB TXPKREA TXPKREB TXPKREU TXPKREY TXPMTCEA TXPMTCEB TXPMTCEU TXPMTEA TXPMTEB

TXPMTEC TXPMTEE TXPMTET TXPMTEU TXPMTEW TXPMTEY TXPMTEZ TXPMTJEA TXPMTJEB TXPMTJEU

TXPMTJHEY TXPMTKEA TXPMTKEB TXPMTKEU TXPMTKEY TXPSPJEA TXPSPJEB TXPSPJEU TXPSPJEY TXPSPKEA

TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA

WPIAP EPODOC'

English limit: None

English results: 0

German query concept 1: ''

concept 2: ''

concept 3: ''

concept 4: ''

concept 5: ''

concept 6: ''

concept 7: ''

concept 8: ''

concept 9: ''

German cluster: ''

German limit: None

German results: 0

French query concept 1: ''

concept 2: 'or nano_crystal+, nano_particle+, quantum_dot+'
concept 3: 'or p_i_n_hetero_junction+, p_i_n_channel+, p_i_n_absorber+'
concept 4: 'or two_dimensional_material+, 2D_material+, graphene+'
concept 5: 'or charge_accumul+, voltage_mode+'
concept 6: 'photo_transistor+'
concept 7: 'or photo_active_layer+, measurement_layer+, intrinsic_semiconduct+_layer+'
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concept 9: 'or crystalline_channel+, amorphous_channel+'
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TXPEF TXPEH TXPEI TXPEP TXPEPEA TXPEPEB TXPES TXPEU TXPEY TXPJPEA TXPJPEB TXPJPOEA
TXPJPOEB TXPKREA TXPKREB TXPKREU TXPKREY TXPMTCEA TXPMTCEB TXPMTCEU TXPMTEA TXPMTEB
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TXPMTJEY TXPMTKEA TXPMTKEB TXPMTKEU TXPMTKEY TXPSPJEA TXPSPJEB TXPSPJEU TXPSPJEY TXPSPKEA
TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA
WPIAP EPODOC'
English limit: None
English results: 0
German query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
German cluster: ''
German limit: None
German results: 0
French query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
French cluster: ''
French limit: None
French results: 0
? XFull Fulltext Patent Search:
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TXPMTEC TXPMTEE TXPMTET TXPMTEU TXPMTEW TXPMTEY TXPMTEZ TXPMTJEA TXPMTJEB TXPMTJEU
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TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA
WPIAP EPODOC'

English limit: None
English results: 0
German query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
German cluster: ''
German limit: None
German results: 0
French query concept 1: ''
concept 2: ''
concept 3: ''
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concept 8: ''
concept 9: ''
French cluster: ''
French limit: None
French results: 0
? XFull Fulltext Patent Search:
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TXPEF TXPEH TXPEI TXPEP TXPEPEA TXPEPEB TXPES TXPEU TXPEY TXPJPEA TXPJPEB TXPJPOEA
TXPJPOEB TXPKREA TXPKREB TXPKREU TXPKREY TXPMTCEA TXPMTCEB TXPMTCEU TXPMTEA TXPMTEB
TXPMTEC TXPMTEE TXPMTET TXPMTEU TXPMTEW TXPMTEY TXPMTEZ TXPMTJEA TXPMTJEB TXPMTJEU
TXPMTJHEY TXPMTKEA TXPMTKEB TXPMTKEU TXPMTKEY TXPSPJEA TXPSPJEB TXPSPJEU TXPSPJEY TXPSPKEA
TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA
WPIAP EPODOC'
English limit: None
English results: 0
German query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
German cluster: ''
German limit: None
German results: 0
French query concept 1: ''

concept 2: 'or nano_crystal+, nano_particle+, quantum_dot+'
concept 3: 'or p_i_n_hetero_junction+, p_i_n_channel+, p_i_n_absorber+'
concept 4: 'or two_dimensional_material+, 2D_material+, graphene+'
concept 5: 'or charge_accumul+, voltage_mode+'
concept 6: 'photo_transistor+'
concept 7: 'or photo_active_layer+, measurement_layer+, intrinsic_semiconduct+_layer+'
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concept 9: 'or crystalline_channel+, amorphous_channel+'
English cluster: 'TCM TXPCNEA TXPCNEB TXPCNEC TXPCNEU TXPCNEY TXPEA TXPEB TXPEC TXPEE
TXPEF TXPEH TXPEI TXPEP TXPEPEA TXPEPEB TXPES TXPEU TXPEY TXPJPEA TXPJPEB TXPJPOEA
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TXPMTJEY TXPMTKEA TXPMTKEB TXPMTKEU TXPMTKEY TXPSPJEA TXPSPJEB TXPSPJEU TXPSPJEY TXPSPKEA
TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA
WPIAP EPODOC'
English limit: None
English results: 0
German query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
German cluster: ''
German limit: None
German results: 0
French query concept 1: ''
concept 2: ''
concept 3: ''
concept 4: ''
concept 5: ''
concept 6: ''
concept 7: ''
concept 8: ''
concept 9: ''
French cluster: ''
French limit: None
French results: 0
? XFull Fulltext Patent Search:
Mode Direct (Patent Search)
English query concept 1: 'or p_i_n_photo_detector+, p_i_n_photo_sensor+, p_i_n_detector+,
p_i_n_sensor+'
concept 2: 'or nano_crystal+, nano_particle+, quantum_dot+'
concept 3: 'or p_i_n_hetero_junction+, p_i_n_channel+, p_i_n_absorber+'
concept 4: 'or two_dimensional_material+, 2D_material+, graphene+'
concept 5: 'or charge_accumul+, voltage_mode+'
concept 6: 'photo_transistor+'
concept 7: 'or photo_active_layer+, measurement_layer+, intrinsic_semiconduct+_layer+'
concept 8: 'or ambipolar+, unipolar+'
concept 9: 'or crystalline_channel+, amorphous_channel+'
English cluster: 'TCM TXPCNEA TXPCNEB TXPCNEC TXPCNEU TXPCNEY TXPEA TXPEB TXPEC TXPEE
TXPEF TXPEH TXPEI TXPEP TXPEPEA TXPEPEB TXPES TXPEU TXPEY TXPJPEA TXPJPEB TXPJPOEA
TXPJPOEB TXPKREA TXPKREB TXPKREU TXPKREY TXPMTCEA TXPMTCEB TXPMTCEU TXPMTEA TXPMTEB
TXPMTEC TXPMTEE TXPMTET TXPMTEU TXPMTEW TXPMTEY TXPMTEZ TXPMTJEA TXPMTJEB TXPMTJEU
TXPMTJEY TXPMTKEA TXPMTKEB TXPMTKEU TXPMTKEY TXPSPJEA TXPSPJEB TXPSPJEU TXPSPJEY TXPSPKEA
TXPSPKEB TXPSPKEU TXPSPKEY TXPSPWEA TXPUSE0A TXPUSE1A TXPUSEA TXPUSEB TXPW0EA TXPW0EA
WPIAP EPODOC'

concept 2: 'or nano_crystal+, nano_particle+, quantum_dot+'
concept 3: 'or p_i_n_hetero_junction+, p_i_n_channel+, p_i_n_absorber+'
concept 4: 'or two_dimensional_material+, 2D_material+, graphene+'
concept 5: 'or charge_accumul+, voltage_mode+'
concept 6: 'photo_transistor+'
concept 7: 'or photo_active_layer+, measurement_layer+, intrinsic_semiconduct+_layer+'
concept 8: 'or ambipolar+, unipolar+'
concept 9: 'or crystalline_channel+, amorphous_channel+'
English cluster: 'XP3GPP XPAIP XPCPVO XPESP XPETSI XPI3E XPIEE XPIETF XPIOF XPIPCOM XPJPEG
XPMISC XPOAC XPRD XPTK' 'BIOSIS COMPDX EMBASE INSPEC MEDLINE TDB' ''
English limit: None
English results: 0

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"US5567971"/PN

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4 NPL Documents found

including 4 large family members

Input for Combi:

"US2016035794"/PN

5 PN Documents found

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53 PN Documents found

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Input for Combi:

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Input for Combi:

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7 PN Documents found

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Input for Combi:

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Input for Combi:

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including 3 large family members

Input for Combi:

"US2014077210"/PN

SEARCH RECORD**Application No: PCT/FI2019/050849**

3 PN Documents found
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Input for Combi:
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Input for Combi:
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26 PN Documents found
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Other Information: