

4

:

:

:

: 68918696

: 1800097975

: 04710@i t. edu. cn

:

: 68912078

: 13910127798

: l i uzd@i t. edu. cn

O

1.

"

"

2

2015 1 1

2017 12 31

3

5

4.

1

2

3

				PCT					
		28		0			9	0	
				SCI	SSCI	EI			
		4			49			1	
		0		0		0		0	
		/							
		0							
		0	0	0	0	1	0	0	
			3		325.0000		1		
								20.0000	

			22		23		16 69.5652 %	40 ()	5 31.2500 %		22 95.6522 %
			4			0			0		4
			79			0			0		4
		()	12			()	59			/	4
			9		18.0000			2			
			2		/	2	/	1	/	0	
		/	5		327.0000		270		27.0000		
		/	/				/				
								2015	39.0000		
			/			/		2016	60.0000	()	3

		1604	0	113	1031.140 0	49	161.7800		2017	115.0000		
--	--	------	---	-----	---------------	----	----------	--	------	----------	--	--

1

2015

300

2016

2015

300

2 PCT Patent Cooperation Treaty

PCT

3

4

5

5

6

7

1. 2015-2017

2015-2017

5 200 5
5 1-2
SCI 10-20 /
8-10
1 2015-2017 9
6
2 2015 2017 28
9 53 2015 SCI 25 2016 SCI
15 2017 SCI 13 5 22
1 1
3 445
214
2015-2017 49 161
1600
4 2015 2
2016 1 Davi d Rooney 2017
1
2015 2017

1 2017

4

David Rooney

201

5

2015-2017

12

59

2

3

"

"

200

1.

1.1

1

2

3

4

1.2

1

2

3

4

1.3

1

2 /
3 /
1.4
1
2
3
1.5
1
2
2
1
6 5 200
2 1-2
3 sci 10-20 /
4 8-10
3.
10 25 1
0 55
4.
1
2
3 3-4
1.

2

/

2.1

2.1.1

1 " " Sr₂Fe_{1.5}Nb_{0.1}M_{0.4}O₆-Ce_{0.8}Sm_{0.2}O_{1.9} SFM

Nb-SDC XRD SEM TEM SFM Nb-

SDC XRD

SFM Nb-SDC EIS SDC

40%

650 700 750 800 0.31 0.47 0.72 1.22 W

cm² SFM Nb-SDC IT-SCFCs Inte

International Journal of Hydrogen Energy

2 Sr_{2-x}Ca_xFe_{1.5}M_{0.5}O₆ (SCFM)

Ca Sr SFM

SCFM Ca 0.4

800 1.26 W/cm² J Power Source

3 Sr₂Fe_{1.5-x}Sc_xMn_{0.506-} (x=0, 0.05, 0.10)

800 27.8 S/cm¹ 0.12 cm²

Sr₂Fe_{1.5-x}Sc_xMn_{0.506-} (SFScxM)

1230 mW/cm² SFSc0.05M SCFCs

4 CuMn₂O₄ MnCo₂O₄ NiMn₂O₄

SCFCs X XRD

SEM

CuMn₂O₄

=78 S/cm¹ MnCo₂O₄ =60 S/cm¹ NiMn₂O₄ =21 S

cm¹ (EIS) CuMn₂O₄ 0.14

cm² MnCo₂O₄ NiMn₂O₄ NiO-YSZ|YSZ|CuMn₂O₄ MnC

o₂ NiMn₂O₄ 800 H₂

1V 1456 892 865 mW/cm²

J Power Source

5 Ni CMF (Ni-CMF)

TPR GC N

CMF

CO 800 433.41 S/cm

-1 Ni-CMF LSGM LSCF

800 580.7 mW/cm²

750 50 mA/cm² N

Electrochimica Acta

6 Ce_{0.6}Mn_{0.3}Fe_{0.102} CMF

XRD BET CMF

24.62 m²/g⁻¹ CMF LSCF

LSGM 800

238.0 mW/cm² N CMF

520.2 mW/cm²

7 YSZ 690

° C 8YSZ 95.8% 8YSZ

0.055 S cm⁻¹ 8YSZ 565

° C SCFC

SCFC

SCFC

YSZ

8 N Ce(Mn, Fe)O₂ N - CMF

SCFC HDCFC

CMF CMF h-NFs

N CMF - NiO

B

Sr₂Fe_{1.5}Mn_{0.5}O₆- Sr₂Fe_{1.4}X_{0.1}Mn_{0.5}O₆-

HDCFC Bi SF

BM Sr₂Fe_{1.4}X_{0.1}Mn_{0.5}O₆- SFBM

N

9 -

SD-Pt-Co/CNT

SD-PtCo/CNT PtCo/CNT Pt/CNT

Pt/C PtCo

ECSA CNT

1.0 M 2.0 M KOH

SD-PtCo/CNT 0.82 mA g⁻¹ PtCo/CNT (0.21

mA g⁻¹) Pt/CNT (0.68 mA g⁻¹) Pt/C (0.18 mA g⁻¹) 3.9 1.2 4.6

SD-PtCo/CNT - 0.70 V (vs. Hg/HgO) P

tCo/CNT Pt/CNT Pt/C - 0.60 V - 0.59 V

- 0.58 V (vs. Hg/HgO) SD-PtCo/CNT

SD-PtCo/CNT

10 Hummers

G N

Ni@Pd/rGO - Ni@Au@Pd - Ni@Au@Pd/rGO -

Pd -

Ni@Au@Pd/rGO Pd Pd Pd

Au Au

EOR CO Pd -

Ni@Au@Pd/rGO Au Pd

11

CoO

CoO@V/S-CNF

OER ORR

CoO@V/S-CNF

CoO@V/S-CNF ORR

0.84 V vs. RHE

Pt/C 1.55 V vs RHE

10 mA cm⁻² CoO@V/S-CNF OER

CoO@V/S-CNF E 0.828

V Pt/C CoO@V/S-CNF

ORR OER CoO /

CoO@V/S-CNF

Co₉S₈CT/Co@V/S-CN

Co₉S₈CT/Co@V/S-CNF Co₉S₈

Co@V/S-CNF ORR Co₉S₈CT/C

Carbon

12

CNFs

N/S Co₉S₈@V/S-CT Co

9S8

			(Cu
Mn ₂ O ₄)	(CNT)		CuMn ₂ O ₄ @
CNT			Co ₉ S ₈ @V ₂ S ₅ -CT
CuMn ₂ O ₄ @CNT	Pt/C		
2 1. 2			
1			396 m ² g ⁻¹
	MMHCSs		
		MMHCSs	
			MMHCSs
1000	530 mAh g ⁻¹	60 A g ⁻¹	
180 mAh g ⁻¹			Journal of Power Sources
2			Si /C
NCs		75%	3D
CNCs			
	0.5 A g ⁻¹		2950 mAh g ⁻¹
100	1226 mAh g ⁻¹	Si /CNCs	
10 A g ⁻¹		547 mAh g ⁻¹	
		Journal of Power Sources	
3		-CMK-3	
		CMK-3	
		CMK-3	
N-		SP	
		" N-O'	
4		" "	SE

I

/

CNF

5 La_{0.5}Sr_{0.5}CoO₂ 91
 La_{0.5}Sr_{0.5}CoO₂ 91
 100 mA g⁻¹
 2.66V La_{0.5}Sr_{0.5}CoO₂ 91
 7205 mAh g⁻¹

1000 mAh g⁻¹ 85
 Electrochimica Acta
 6 (3D) ZnCo₂O₄
 XRD BET ZnCo₂O₄
 127.2 m² g⁻¹ 3D ZnCo₂O₄
 (KB) 6024 mAh g⁻¹
 100 mA g⁻¹ ZnCo₂O₄
 220 mV ZnCo₂O₄
 3D Material Letter
 7 NiCo₂O₄
 Ni foam
 NiCo₂O₄@Ni foam

0.1 mA cm⁻² 2.2-4.4 V 500 mAh g⁻¹ 300
 1400 h 100 mAh g⁻¹ 140 ACS Applied
 Materials & Interfaces
 8
 3.5 mg cm⁻²
 NiCo₂O₄ CuCo₂O₄@Ni

	Li 202		Li 2003	Li CH	Li 20
9	"	"		"	"
			hollow cupric oxide sphere	HCOS	
			HCOS-S		
	1 C		3.5 mg cm ²		1015
mAh g ⁻¹	3.6 mAh cm ²	500		883 mAh g ⁻¹	
	98%				
				Journal of Materials Chemistry A	
10			carbon Nanofiber	CNF	
	polyvinylidene fluoride	PVDF			
		CNF/PVDF	1C		1
739.2 mAh g ⁻¹		100	680 mAh g ⁻¹		
	CNF/PVDF				"
"					
			Journal of Power Sources		
11			(carbon fiber cloth CFC)		"
"					
	1C		920 mAh g ⁻¹		Electrochimica Acta
12		MnO ₂ @GP	-MnO ₂		
	100 m ² g ⁻¹				MnO
2@GP			1400 mAh g ⁻¹	100	600 mAh g ⁻¹
1	10	100	0.3%	MnO ₂	@GP
		MnO ₂			MnO
2	@GP				E
					Electrochimica Acta
	2.1.3				
	1				

4 / - / / V86
Organic Electronics

2 13% SM15
- SM15

-
SM15
SM15 SM15

V8-5
Dyes and Pigments

3
CoFeO4
Co9S8 / /

J. Power Source

2 1.4
1 NH3-SCR Ni2Co1Ox 100% NOx
150-300

NOx SO2 N2 Ni2Co1Ox
Ni4+ Co3+

Catalysis Communications

2 LSM LSMM
6% NO 1000ppm LSMM LS
M /BZCY/NiO 800 12 mW/cm2 45 mW
cm2 LSMM H-SCFC

NO O2

NO

3

/

80%

4

BET

SE

M

N - Mo

Ni - Mo/Al 2O3

n

n

5

Pd-Cu

Pd-Cu

Mo2C

Pd

Mo3

20%CH4/H2

Mo2C

Mo2C

6 C-H

C-H

C-H

PCU

JP-10

C-H

C-H

C-H

2.2

1

" "

60 Ah

250 Wh kg⁻¹

GJB6789-2009z

28 V

60 Ah 100V 60Ah

210 Wh kg⁻¹

200 Wh kg⁻¹

2

PE PP

PE PP

4

3

1.

"

"

863
 583
 5 SCI 17 2 ACS
 Applied materials & interfaces, J. Power Sources, Electrochem Commun, Int
 . J. Hydrogen Energy, Electrochimica Acta
 1995 7 1998 2
 2001 6
 2002 1 -2004 5
 2 1 10
 100 SCI 50 EI 20
 3
 1960 9
 18 6 120 1
 1 1 1
 1
 1961
 1981
 1968
 /
 1976
 1974
 1980

1983

1983

1977

1976

1979

1978

1977

1988

1988

1988

1981

David Rooney 1972

2

1

9	2015	2	2016
	1	David Rooney	2017
			1

2

3

3.

"

" " -

"

/

1

2

3

4

5

1

2015

2

2016

1

David Rooney

2017

1

2

2017

4

3

2015

2017

1

4

2015

2015

" 2015-

"

2016

2

016

Graham

2017

2017

1.

1
2
3
4
5

2016 04 19

2016

1 - SnO2

- SnO2

SnO2

SnO2 SnO2@C SnO2@C@S- GAs

3

1200 1765 1795 mAh/g

70

SnO2

150mAh/g 150

SnO2@C

405 mAh/g

SnO2@C@S- GAs

150

867 mAh/g

1 Scientific Reports, 2015, 5, 12154, I

F=5. 5) The 10th Si no-US Nano Forum

2

Pd

Pd

Pd

PdNi Pd r Pd r Ni Pd
 Pd Pd Ni Pd Ni Pd
 Pd r PdNi Ni Pd Pd r Ni Pd
 -0.68V 128mA/cm² -0.08V
 Pd

3

SEI

GO/o-CNT

GO/o-CNT

GO/o-CNT

4

N S B P O

ORR 400 N 900 N

ORR 900 ORR
 C₃N₄ N 900

CRR
 CRR
 2016-20
 17
 1
 2 SCFC
 3
 4
 5
 2017 12 9
 2017
 1 " "
 CC CNTs
 MnO2
 600 1800
 2 " "
 SEI /
 Cu|Li
 Li +
 2017 2
 018

1	2017			
2				
3		SCFC		
4				
5				
2				
1		XRD		
2				
			"	"
2016				"
			2017	
3				
		Kotov		David Rooney
2015		5 /		
WARWICK		Volkan Degirmenci		
		2015		2
				2015
7			8	
		2016		"
		"	13	24

Lostty

24

3.

1

PI

2017

"

"

300

250 Wh/kg

2017

2018

2

"

"

3

/

2022

- 10

- 23

4

"

"

"

"

-

2017

David Rooney

SCFC

2

018

4.

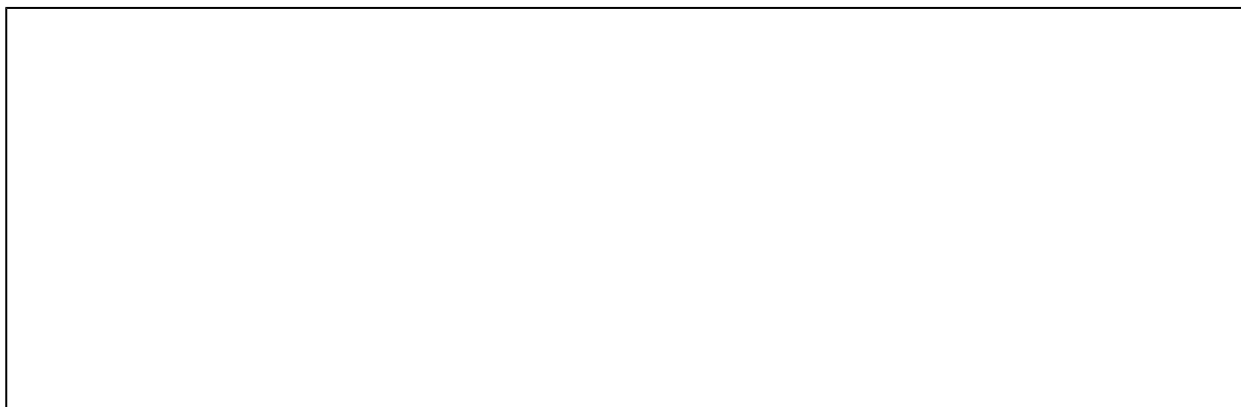
/ / /

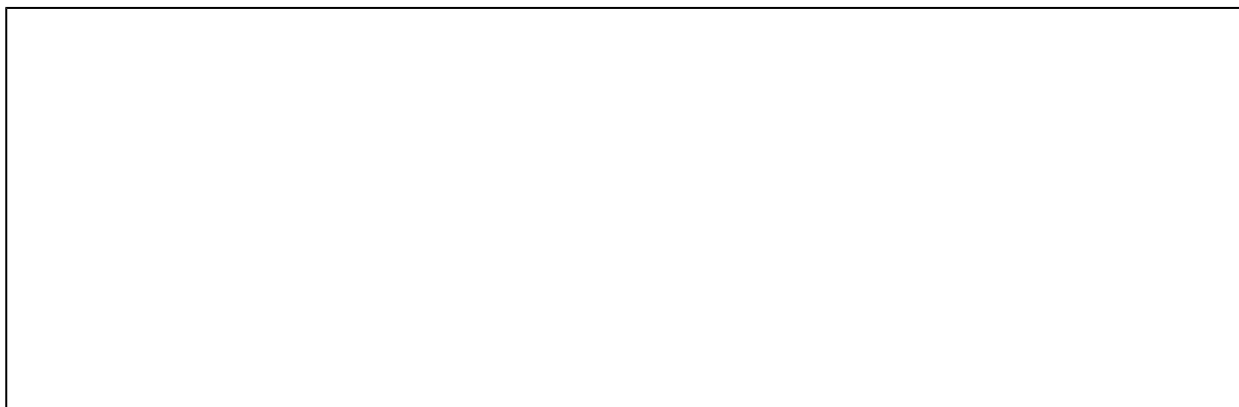
5.

		3	1
		4	
2	2		
	214	2015-2017	49
161			
	1600		

(10)	2015- 2017	9
(45)		43
(25)		24
(20)		18
		94

2018 04 23 - 2018 04 30





1	
2	
3	
4	
5	

1

1

1	4H		2015	77.0		A
2	SCFC		2015	24.6		A
3			2015	80.0		A
4	SCFC		2015	67.0		A
5			2015	25.0		A
6			2015	35.0		A

7	M2C	1, 3-	2016	20.0		A
8			2016	19.54		A
9		(21773007)	2017	65.0		A

1
2
3
4

863 973
A B A
300 2014

B
2013

A
300

2013

(1)

--	--	--	--	--	--	--

(2)

1	*****		2015	100.0	863.0	A
2	*****		2015	25.0	863.0	A
3			2016	50.0		A
4	" "		2016	20.0		A
5			2016	6.0		A
6	" "		2016	1.5		A

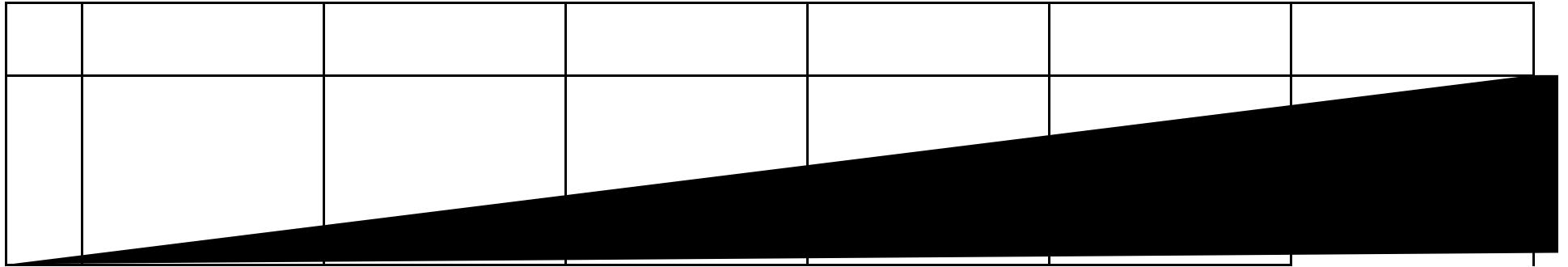
1
2
3
4

A B A
300 2015

B
2014 300

A

2014



	intermediate temperature solid oxide fuel cells	Wang, David Rooney, Kenning Sun*		Sources		
5	Ultrastrong Polyzole Nanofiber Membranes for Dendrite-Proof and Heat-Resistant Battery Separators	Xiaoming Hao, Jian Zhu, Xiong Jiang, Haitao Wu, Jinhua Qiao, Wang Sun, Zhenhua Wang*	2016	Nano Letter		13.8
6	The Ca element effect on the enhancement performance of Sr ₂ Fe _{1.5} MO _{6-δ} perovskite as cathode for intermediate-temperature solid oxide fuel cells	Jinhua Qiao, Wenjun Chen, Wenyi Wang, Zhenhua Wang, Wang Sun	2016	Journal of power source		6.4
7	Flexible carbon nanofiber/polyvinylidene fluoride composite membranes as interlayers in high-performance Lithium-Sulfur batteries	Zhenhua Wang, Jing Zhang, Yuxiang Yang, Xinyang Yue, Xiaoming Hao	2016	Journal of power source		6.4
8	Covalently functionalized TiO ₂ with ionic liquid: A high-performance catalyst for photoelectrochemical water oxidation	Lin Jing, Min Wang, Xinyuan Li, Ruoyun Xiao, Yufei Zhao, Yuxia Zhang, Yi-Ming Yan, Qin Wu, Kenning Sun	2015	Applied Catalysis B: Environmental		9.4

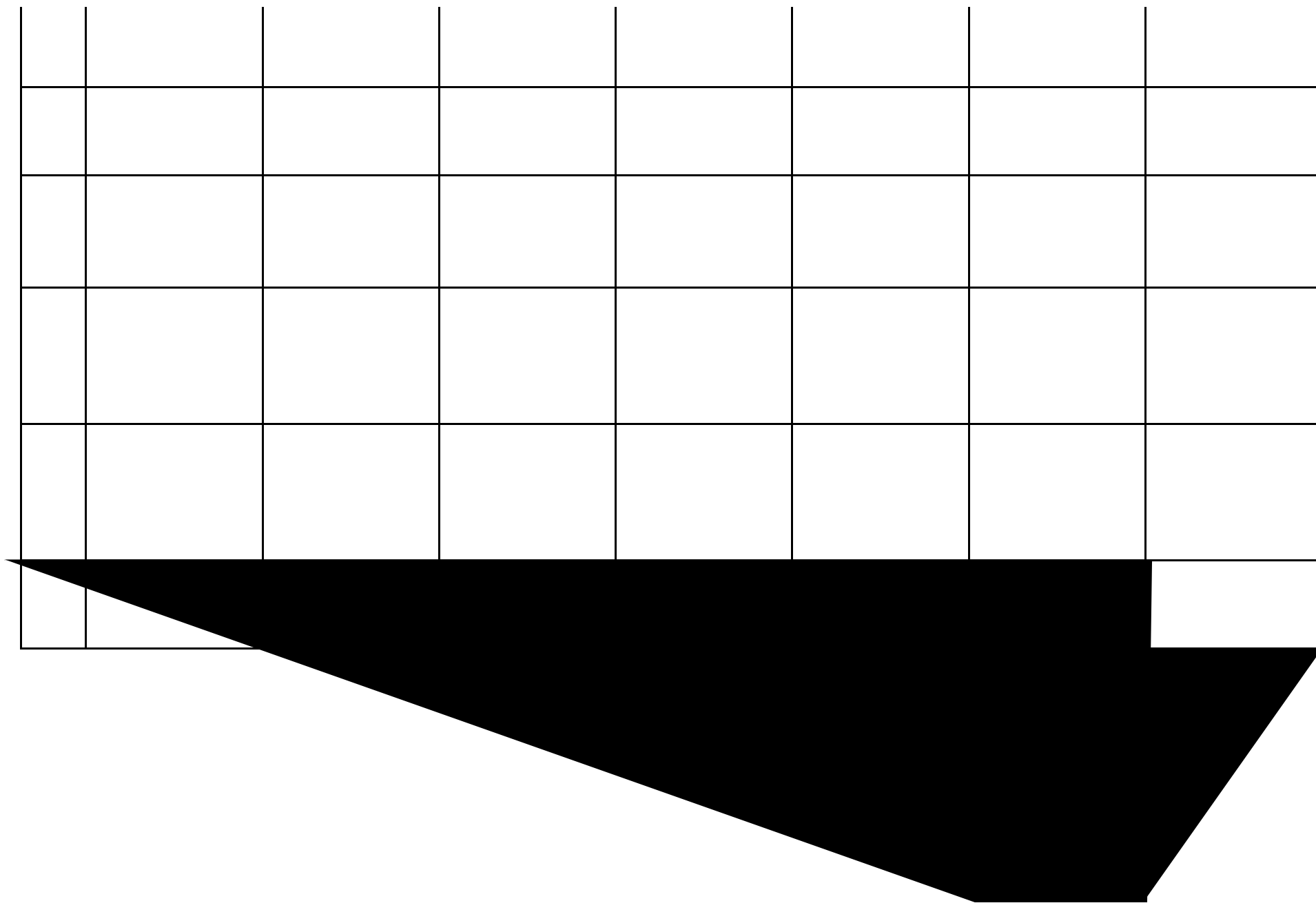
9	A bulky and flexible electrocatalyst for efficient hydrogen evolution based on the growth of MoS ₂ nanoparticles on carbon nanofiber foam	Xin Guo, Guo-Lin Cao, Fei Ding, Xinyuan Li, Shuyu Zhen, Yi-fei Xue, Yi-ming Yan, Ting Liu, Ke-ning Sun	2015	Journal of Materials Chemistry A		8.9
10	Diethylenetriamine (DETA)-assisted anchoring of Co ₃ O ₄ nanorods on carbon nanotubes as efficient electrocatalysts for the oxygen evolution reaction	Yu-Xia Zhang, Xin Guo, Xue Zhai, Yi-Ming Yan, Ke-Ning Sun	2015	Journal of Materials Chemistry A		8.9

1			2017

3

/

			/		/		PCT
1		2 01510379299E 11		2017			
2		ZL201720248171 .5		2017			
3		2 017112887081 E12		2017			
4		2 01711285931E 12		2017			
5		201711285919X		2017			
6		2 017110136158 E12		2017			
7		2 017110093148 E12		2017			



16		E11		2016			
17		201610244227. X		2016			
18	/	2 016110637091 E11		2016			
19	/	2 016110632064 E11		2016			
20		2 016109367759 E12		2016			
21		ZL201410286215 . 4		2016			
22		2 013105410027 E11		2015			
23		2 015106087041 E11		2015			
24	/	2 015106440476 E11		2015			

25		CN104987343A		2015			
26							

35		CN104953102A		2015			
36		CN104900830A		2015			
37		CN104900910A		2015			

1

2

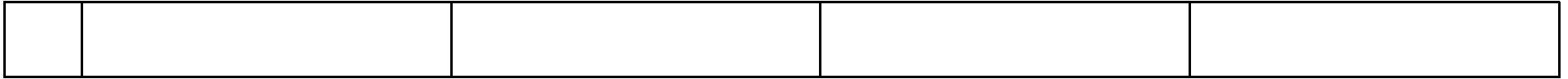
3 PCT Patent Cooperation Treaty

/

PCT

4 PCT

4



1
2

A B A

B

5

1	****	2017						2017

- 1
- 2
- 3
- 4

" 5

"

6

1					2016		20.0
2					2015		5.0
3					2015		300.0

2

1

1			1964-01-20							2006-6
2			1954-09-09							2000-6
3			1972-12-06							
4			1968-12-02							
5			1976-01-04							
6			1961-01-20							
7			1982-08-13							
8			1980-10-14							
9			1974-04-19							
10			1983-08-06							

11			1983-01-16							
12			1977-08-07							
13			1976-06-11							
14			1979-09-01							
15			1978-09-19							
16			1977-04-20							
17			1988-01-11							
18			1982-12-30							2013-6
19	David Rooney		1972-08-01							2016-6
20			1981-06-01							
21			1960-09-12							2001-9
22			1988-03-08							
23			1988-11-11							

2
3
4
5

2

		2015		2016		2017	
1							
2							
3				David Rooney	1		1
4			2				

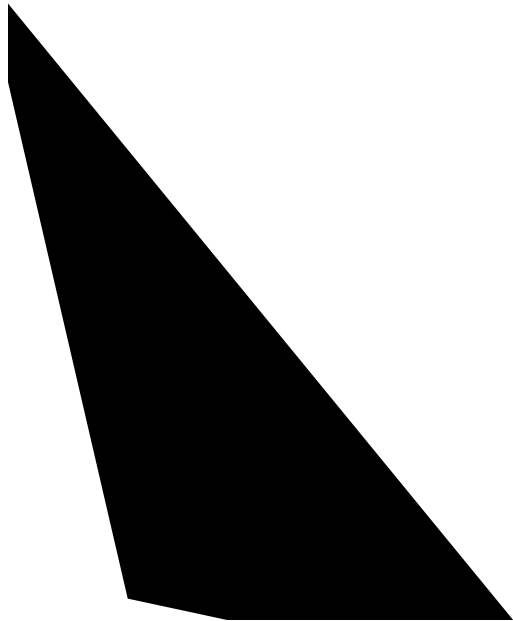
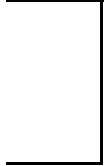
3

		2015		2016		2017	
1							
2							
3							4
4		()	5	()	3	()	4
5		()	22	()	21	()	16
5							1
6							1
7							1
8							1

3

1

1					
2					
3					
4					
5					
6					
7					
8					
9					



4

1

1	- SnO2				2015	2 0
2					2015	2 0
3					2015	2 0
4					2015	2 0
5					2016	2 0
6	Pd -				2016	2 0
7					2016	2 0
8					2017	2 0

9					2017	2 0
---	--	--	--	--	------	-----

2

1				2016 6 -12 Graham
2			Uni versi ty of Cal i forni a, Daxi s	2017 11 -2018 11

3

1	2015	
2	2015	
3	2015	8
4	2016	"
5	2017	
6	2017	

4

/

					/
1			2016		"
2			2016		

--	--	--	--

