

Supplementary Informations

Flexible Transparent Conducting Electrodes Based on Metal Mesh for Organic Optoelectronic Device Applications: A Review

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Table S1. Summary of photovoltaic device performance employing metal meshes TCEs

Metal mesh TCE	Fabrication Techniques	T_{550nm} (%)	R_{sheet} ($\Omega/\square$)	Device types	Device architecture	Active area (cm^2)	PCE (%)	Ref.
DEG-PEDOT/Ag grid	Lithographic deposition	~85 ^a	~70	OSC	Glass/Ag grid/DEG-PEDOT/APFO-Green5:PC ₆₁ BM/Al	0.08	1.00	1
PEDOT:PSS/Ag grid	Lithography	~79 ^a	9.1	OSC	Glass/Ag grid/PEDOT:PSS/ZnO/P3HT:PC ₆₀ BM/PEDOT/Ag	-	2.97	2
PEDOT:PSS/Ag grid	Thermal imprinting	>80 ^a	-	OSC	PET/Ag grid/PEDOT:PSS/ZnO/P3HT:PCBM/PEDOT:PSS/Ag	6.00	1.84	3
PEDOT:PSS/Ag honeycomb	Inkjet printing	>70 ^a (PEDOT:PSS only)	~200 (PEDOT:PSS) ~1 (Ag honeycomb)	OSC	PEN/Ag honeycomb/PEDOT:PSS/P3HT:PCBM/LiF/Al	4.00	1.82	4
PEDOT:PSS/Ag honeycomb	Screen printing	-	~5-12 (Ag honeycomb)	OSC	PET/Ag honeycomb/PEDOT:PSS/P3HT:PCBM/LiF/Al	~5.00	1.92	5
PEDOT:PSS/Ag honeycomb	Printing	~85 ^a (Ag honeycomb only)	4.5	OSC	PET/Ag grid/PEDOT:PSS/P3HT:PCBB-C8/LiF/Al	1.21	1.36	6
PEDOT:PSS/Ag grid	Printing	~80 ^a	~1.2	OSC	PET/Aggrid/PEDOT:PSS/ZnO/PFN/PTB7:PC ₆₁ BM/MoO ₃ /Ag	1.21	5.85	7
Graphene/Ag grid	Inkjet printing	~85 ^c	<20	OSC	PET/Ag grid/Graphene/PEDOT:PSS/P3HT:ICBA/TiO _x /Al	~0.05	2.10	8
a-ITO/Ag grid MEFS	Gravure-offset printing	~93 ^b	~13	OSC	PI//Ag grid/a-ITO/PEDOT:PSS/PBDTTTC:PC ₆₀ BM/Al	10.00	~4.00	9
PEDOT:PSS/Ag grid ME-TCE	Gravure-offset printing	~90 ^b	~4	OSC	NOA/Ag grid/PEDOT:PSS/ZnO/PTB7:PC ₇₁ BM/PEDOT:PSS/Ag	0.38	7.46	10
Graphene/Au grid	Evaporative Assembly	~92 ^b (Au grid only)	~97	OSC	PET/Ag grid/PEDOT:PSS/ZnO/PTB7:PC ₇₁ BM/TiO _x /Al	<1.00	4.12	11

PEDOT:PSS/Au honeycomb	Mould assisted deposition	67-70 ^a	-	OSC	SU8/Au grid/PEDOT:PSS/PEIE/P3HT:ICBA/MoO ₃ /Ag	~9.30	2.40	12
PEDOT:PSS/Ag honeycomb	UV-Nanoimprinting lithography	82-86 ^b	-	PSC	PET/Ag mesh/PH1000/PEDOT:PSS/MAPbI ₃ /PCBM/Al	0.10	~14.00	13
c-ITO/Ag NWs	Spin-coating (AgNWs); sputtering (c-ITO)	>80 ^a	37	PSC	GFRHybrimer/AgNWs/c-ITO/PEDOT:PSS/Perovskite/PCBM/BCP/Ag	-	14.15	14
c-ITO/CuNWs	Spin-coating (CuNWs); sputtering (c-ITO)	>80 ^a	41.9	PSC	GFRHybrimer/CuNWs/c-ITO/PEDOT:PSS/Perovskite/PCBM/BCP/Ag	-	12.95	14

a= including substrate; b = excluding substrate; c = not specified

Table S2. Summary of OLED device performance employing metal mesh TCEs

Properties of metal mesh TCEs				OLED performance parameters				Ref.
Type	Fabrication Method	T_{550nm} (%)	R_{sheet} ($\Omega/\square$)	L (max.) (cd/m ²)	LE (cd/A)	PE (max.) (lm/W)	EQE (%)	
Cu mesh	Nanoimprint lithography	~70 ^c	10.8	-	-	-	-	15
Ag hexagonal grid	Photolithography	71.8 ^c	~200	15044	-	-	-	16
Ni + Cr Finger	Photolithography	-	-	3321	29.8	15.57	8.7	17
PEDOT:PSS / Al gird	Photolithography + wet etching	~70 ^c	40	2396	-	-	11.8	18
a-ITO /Ag mesh	Gravure offset	93 ^b	13	-	58.8	33.2	-	19
Ag mesh/ITO	Gravure offset	88 ^c	~6.9	-	-	-	3.17	20
Ag mesh	Gravure offset	~95 ^b	~4	-	50.27	32.23	-	21
Ag mesh	Gravure offset	75.9 ^a	~4	2880/3263	-	-	7.9/7.4	22
Ag hexagonal mesh	Photolithography +electroforming+scratching	87 ^a	~5	-	-	52.0 (G)	19.8	23
Ag grid-Ag NWs	Ink-jet printing	~87.5 ^a	~22.5	10000	11.3	-	-	24
Au-grids/graphene	Flow-coating	92 ^c	~97	-	10.1	3.42	-	25
Ag grid	Temp. controlled direct imprinting	~91 ^a	~5.5	111.6	-	61.8	22.0	26
Cu mesh	Breath-figure method	83.5 ^a	28.7	10000	-	-	-	27

a= including substrate; b = excluding substrate; c = not specified, G-green

Table S3. Summary of SC/EC device performance employing metal mesh TCEs

Current collector	T_{550nm} (%)	R_{sheet} (Ω / $\square$)	Electrode	Electrolyte	Fabrication Techniques of current collector	Areal Capacitance (mF/cm ²)				Ref
						Three-electrode measurement		Two-electrode measurement		
						CV	GCD	CV	GCD	
Au Nanomesh	71 ^a	13	Au/MnO ₂ Nanomesh	LiClO ₄ /PVA	Nanosphere lithography	-	4.72 @ 5 μ A/cm ²	-	0.795 @ 5 μ A/cm ²	28
Ag Grid	90 ^a	2	PEDOT:PSS/ Ag grid	PVA/H ₃ PO ₄	Laser direct-writing	-	-	2.79 @ 10 mV/s	-	29
Ni mesh	84 ^a	0.2	Ni mesh	PVA/H ₃ PO ₄	Laser direct-writing	-	-	0.52 @ 50 mV/s	-	30
Ni network	84 ^b	16	MnO ₂ /Ni network	PVA/LiCl	Laser direct-writing	80.7 @ 5 mV/s	-	10.6 @ 10 mV/s	-	31
Au mesh	72 ^a	32	MnO ₂ /Au	PVA– H ₂ SO ₄	Crackle template	-	-	1.98 @ 100 mV/s	3 @ 5 μ A/cm ²	32
Ag grid	89 ^a	12	PEDOT:PSS/ Ag grid	PVA/H ₃ PO ₄	Inkjet-printed	-	-	1.13 @ 100 mV/s	-	33
Au grid	83 ^a	23	RGO/Au grid	PVP/EC/TAP	Thermal evaporation	-	-	-	-	34
Ag grid	79 ^a	20	300um Pitch Ag grid	PMMA / Viologen in PC	EHJ	-	-	-	-	35
Ag grid	75 ^a	0.69	WO ₃ /PEDOT:PSS/ Ag grid	Aqueous H ₂ SO ₄	Self-assembled Ag NPs	-	-	Specific: 221.1 F/ g	-	36

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