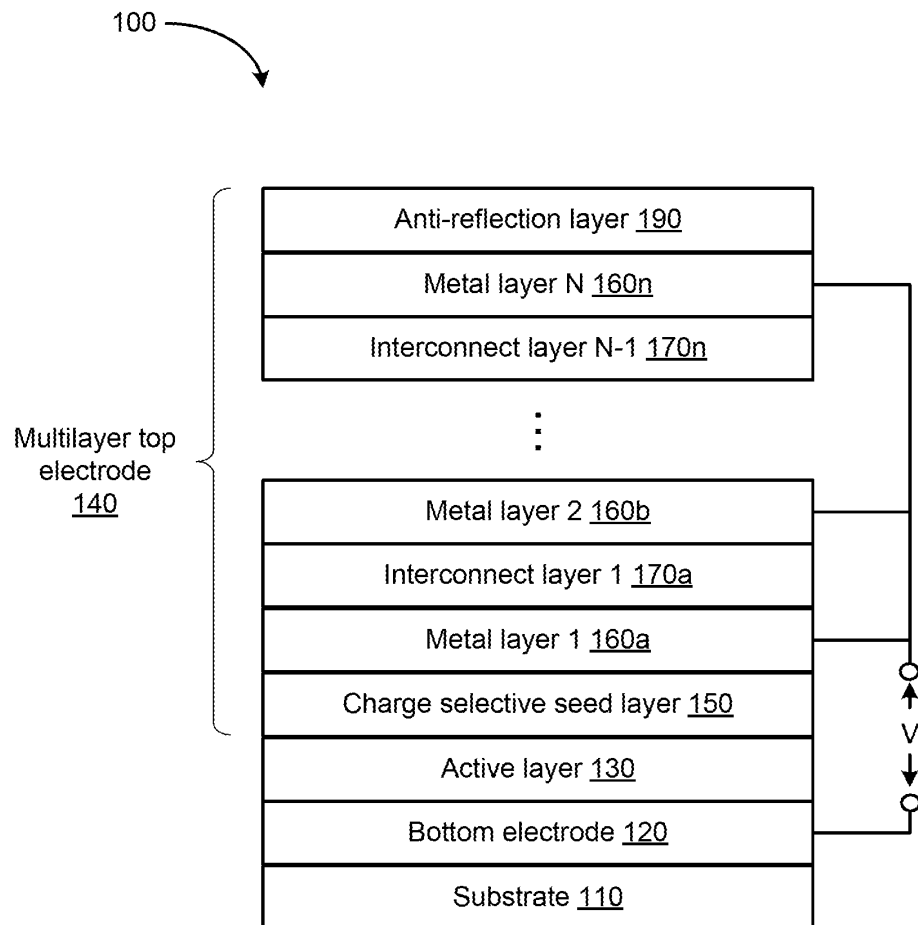


**FIG. 1**

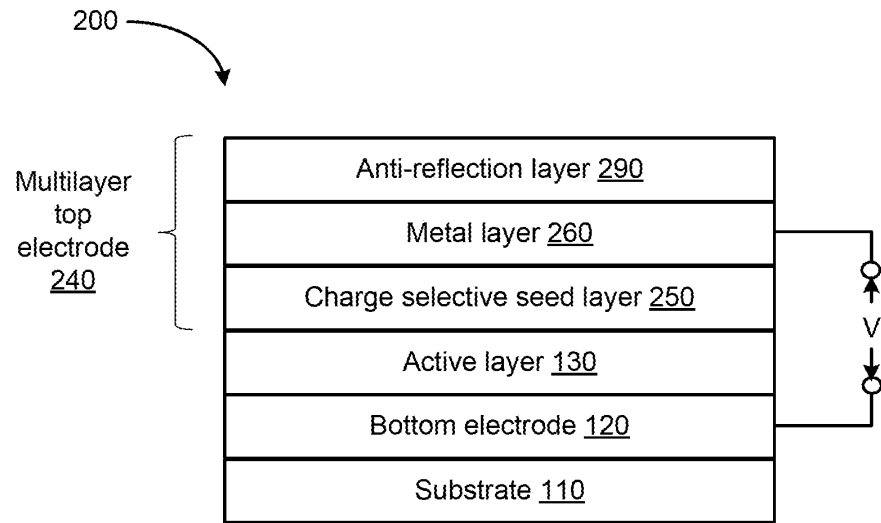


FIG. 2A

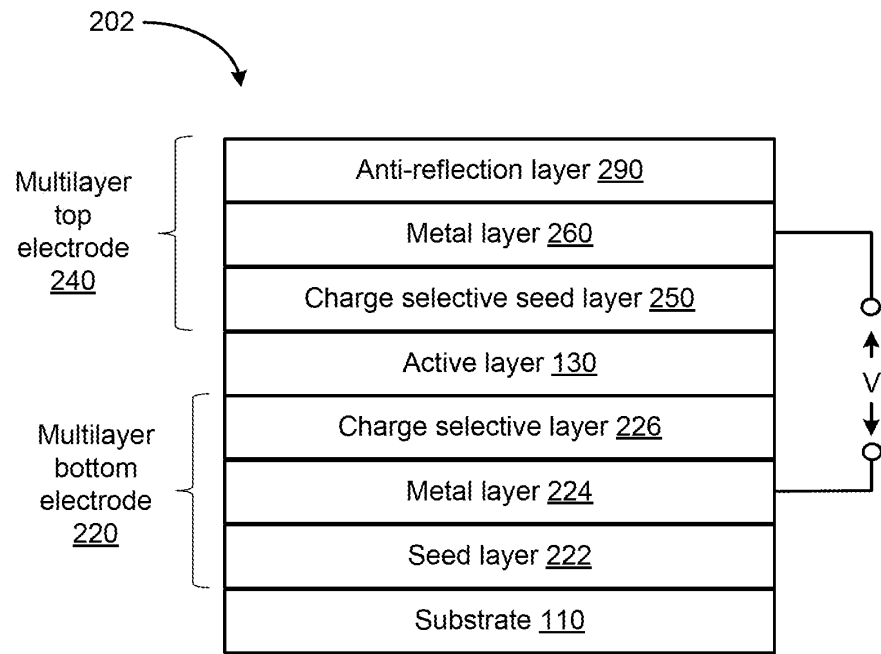


FIG. 2B

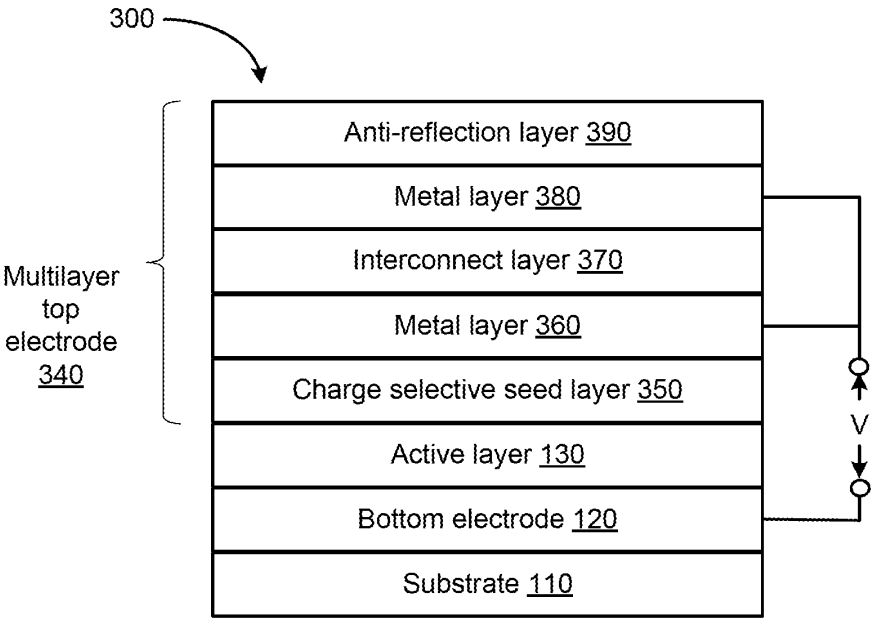


FIG. 3A

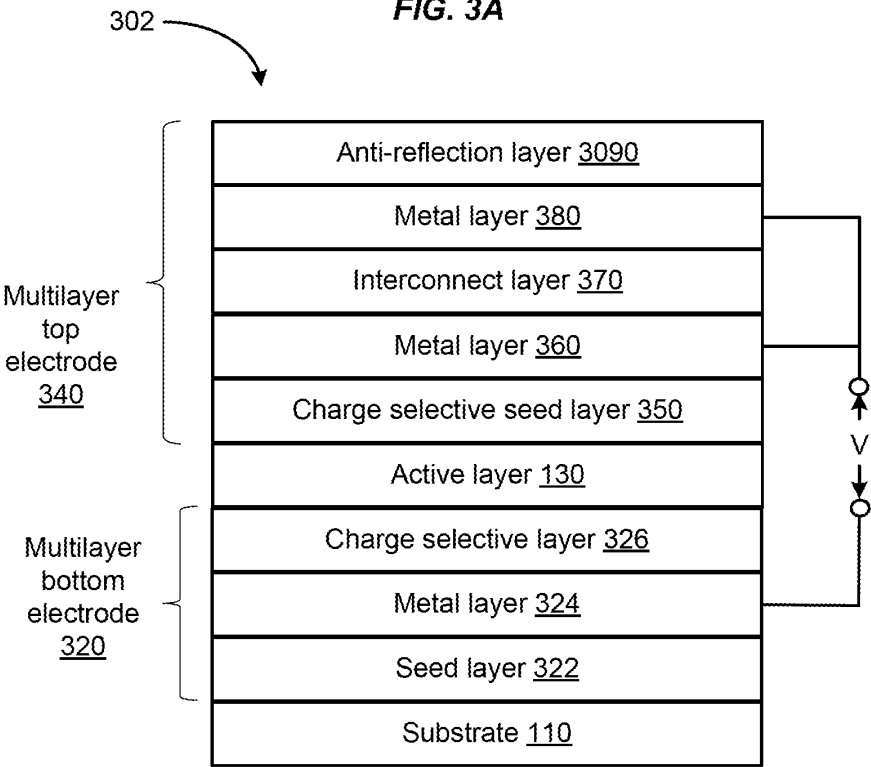


FIG. 3B

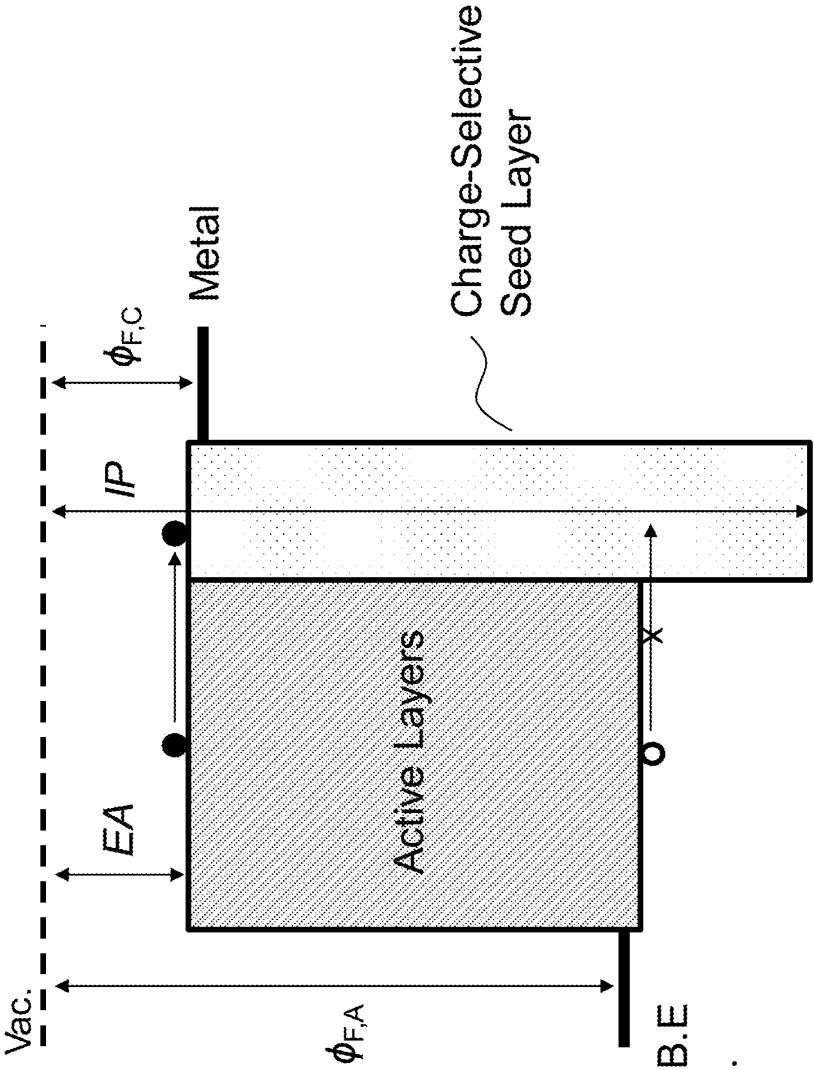


FIG. 4

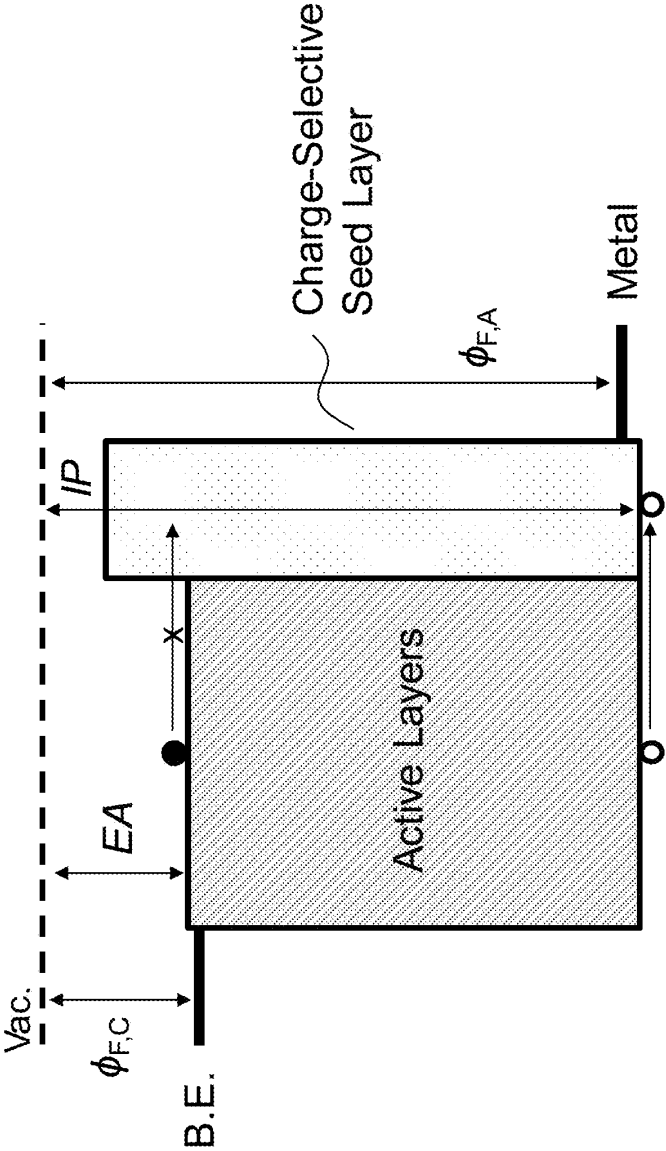


FIG. 5

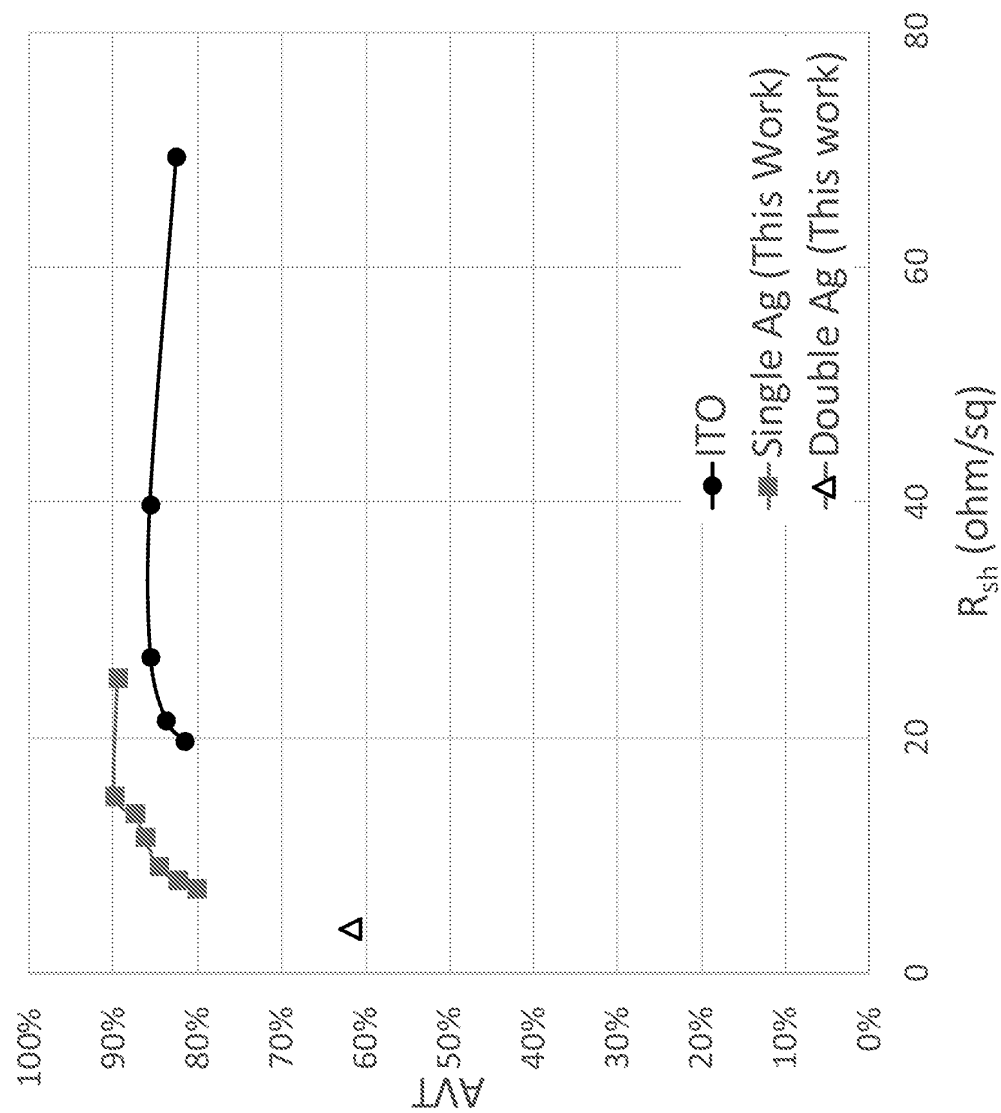
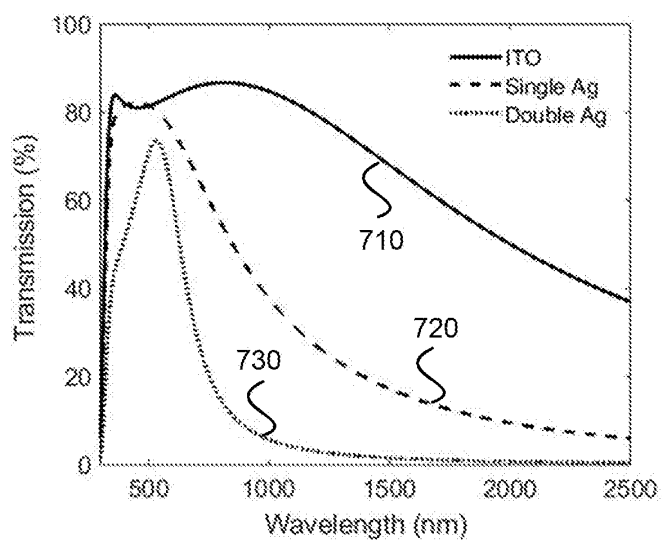
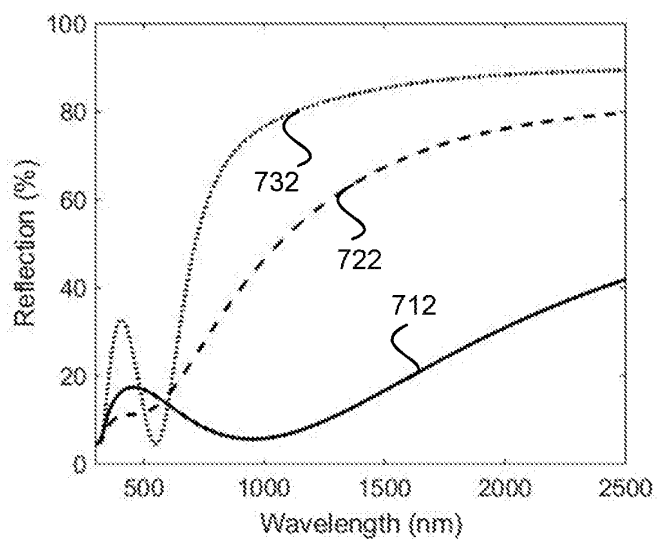
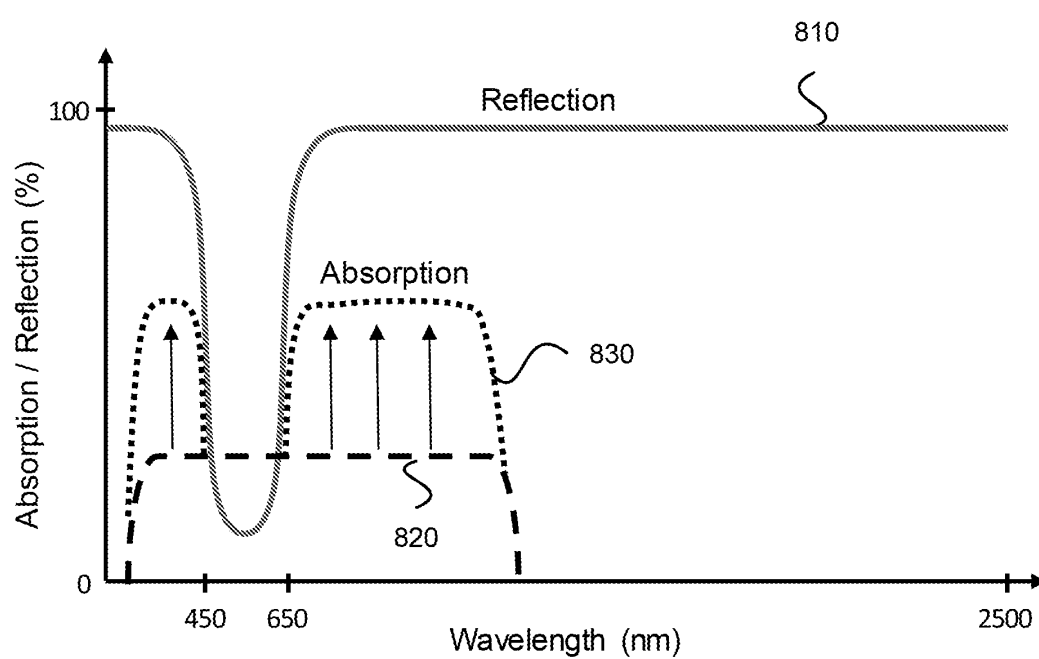


FIG. 6

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**FIG. 7A****FIG. 7B**

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**FIG. 8**

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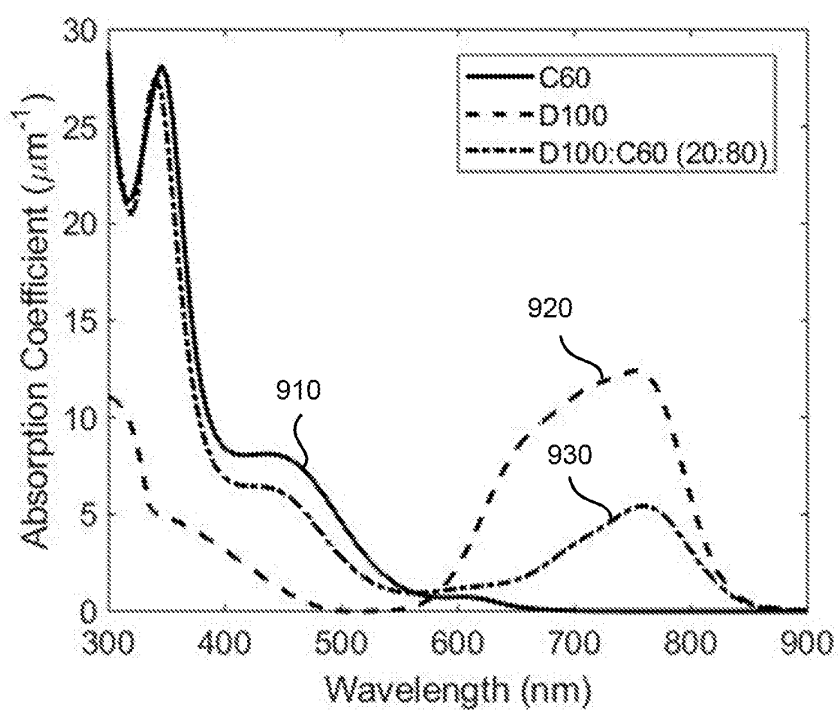


FIG. 9

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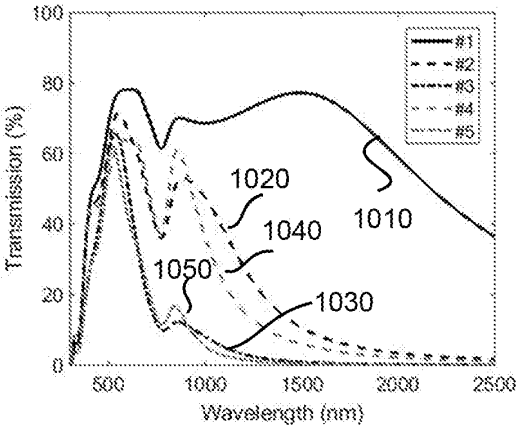


FIG. 10A

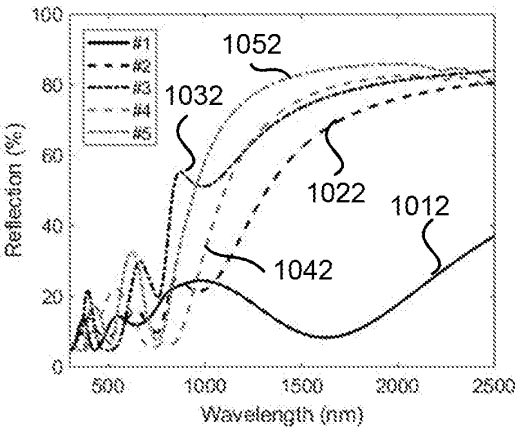


FIG. 10B

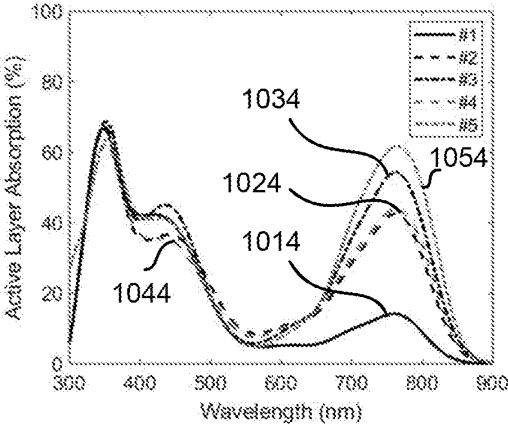
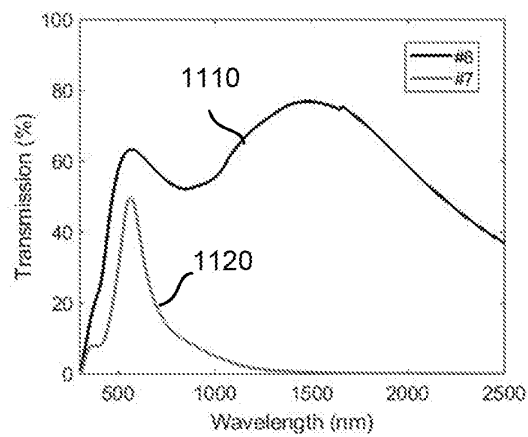
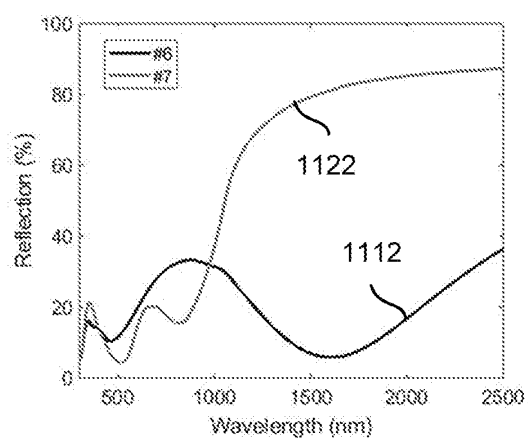
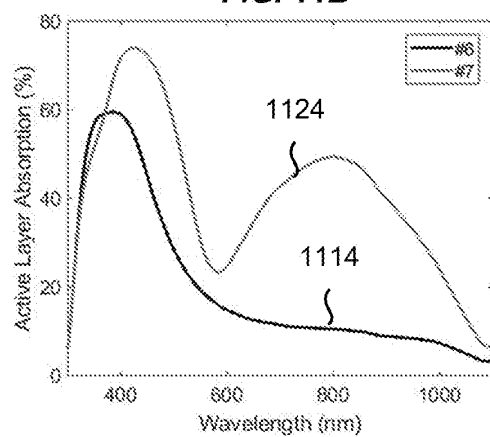
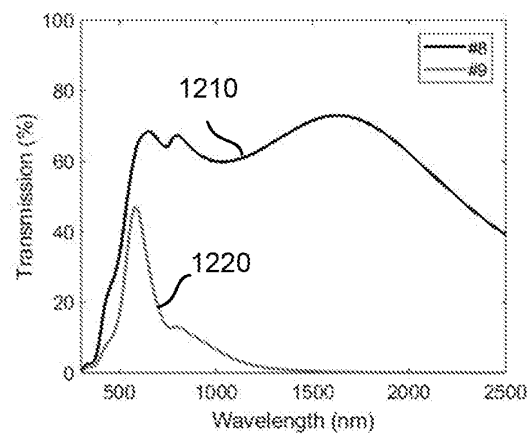
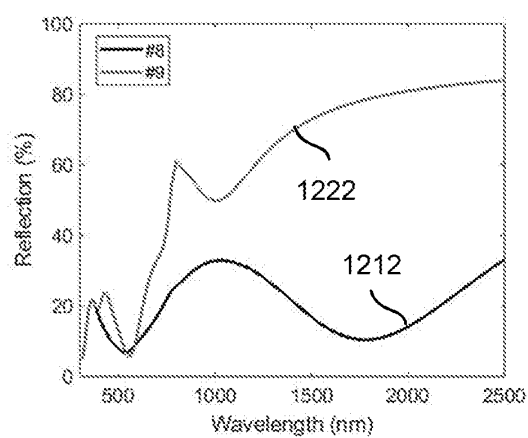
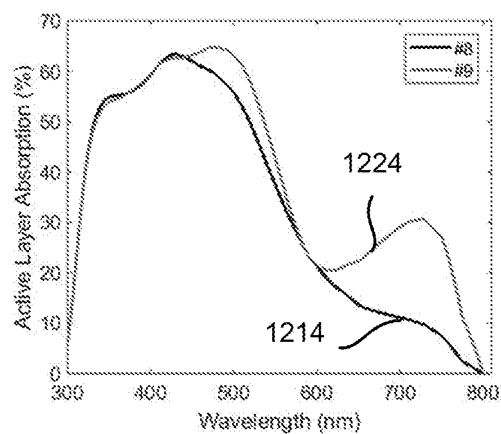


FIG. 10C

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**FIG. 11A****FIG. 11B****FIG. 11C**

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**FIG. 12A****FIG. 12B****FIG. 12C**

Stack #	PV Type	Bottom Electrode	Top Electrode	AVT (%)	T _{soi} (%)	AVT/T _{soi}	Max J _{sc} (mA cm ⁻²)
1	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO (5/50nm)	75	67	1.11	4.4
2	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO/Ag/SiO ₂ (5/10/12.5/65nm)	67	45	1.49	7.4
3	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO/Ag/ITO/Ag/SiO ₂ (5/10/12.5/60/12.5/10nm)	57	25	2.28	8.5
4	OPV	ITO/Ag/ITO/MoO ₃ (10/5.5/10/8nm)	TPBi:C60/ITO/Ag/SiO ₂ (5/10/12.5/65nm)	60	42	1.43	7.5
5	OPV	ITO/Ag/ITO/MoO ₃ (10/5.5/10/8nm)	TPBi:C60/ITO/Ag/ITO/Ag/SiO ₂ (5/10/12.5/60/12.5/10nm)	51	23	2.21	9.2
6	CIGS	ITO (70nm)	ZnO/ITO (10/50nm)	61	56	1.08	7.6
7	CIGS	ITO (70nm)	ZnO/Ag/ITO/Ag/SiO ₂ (10/14.5/80/14.5/10nm)	41	17	2.41	17.6
8	MAPbI ₃	ITO/Spiro-OMeTAD (70/20nm)	TiO ₂ /ITO (10/50nm)	52	54	0.96	7.9
9	MAPbI ₃	ITO/Spiro-OMeTAD (70/20nm)	TiO ₂ /Ag/ITO/Ag/SiO ₂ (10/14.5/80/14.5/10nm)	34	15	2.26	10.0
10	OPV	ITO/PEDOT:PSS (70/40nm)	TPBi:C60/Ag/HATCN/TAPC/TPBi:C60/Ag/TAPC (5/14/45/50/5/14/60nm)	46	18	2.56	23.1

FIG. 13

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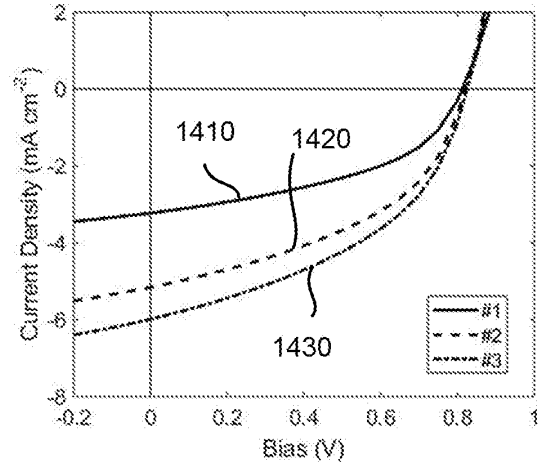


FIG. 14A

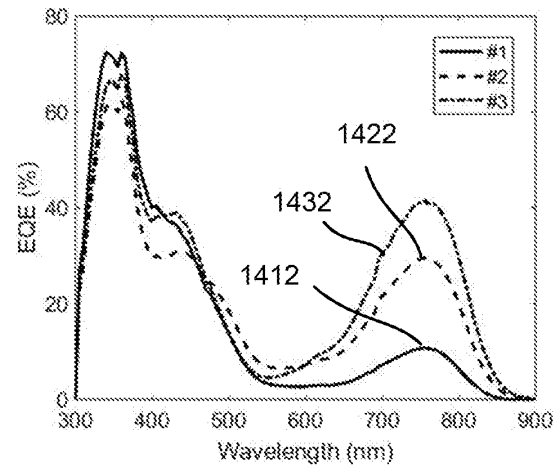


FIG. 14B

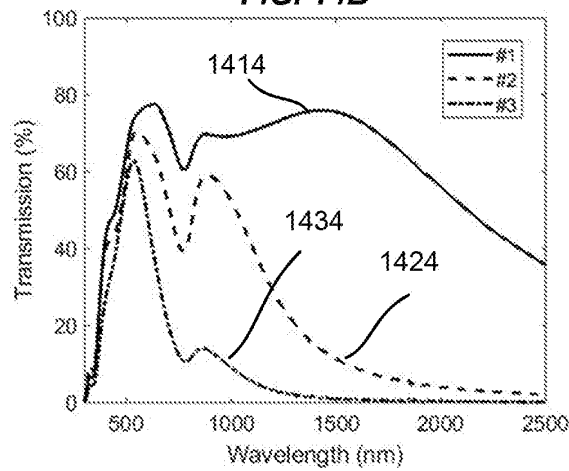
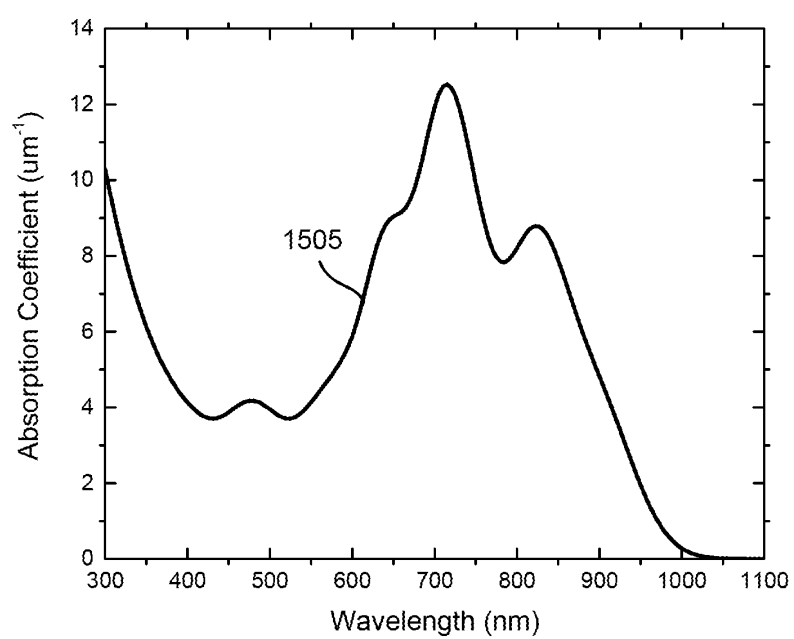


FIG. 14C

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**FIG. 15A**

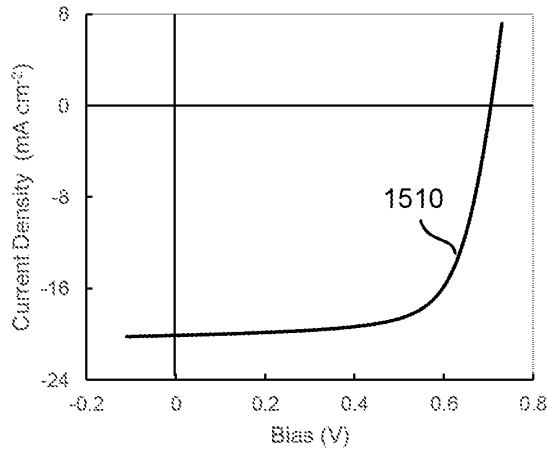


FIG. 15B

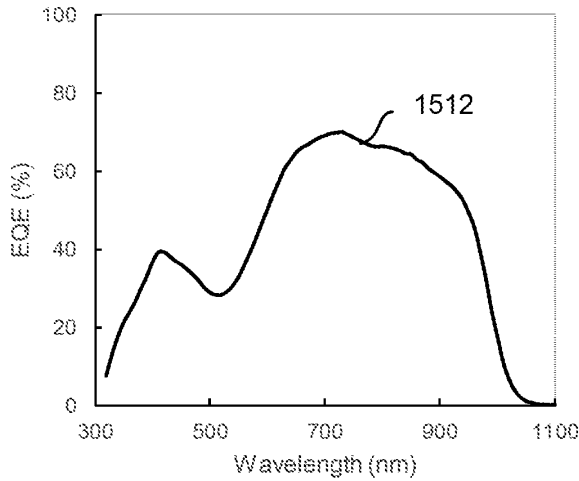


FIG. 15C

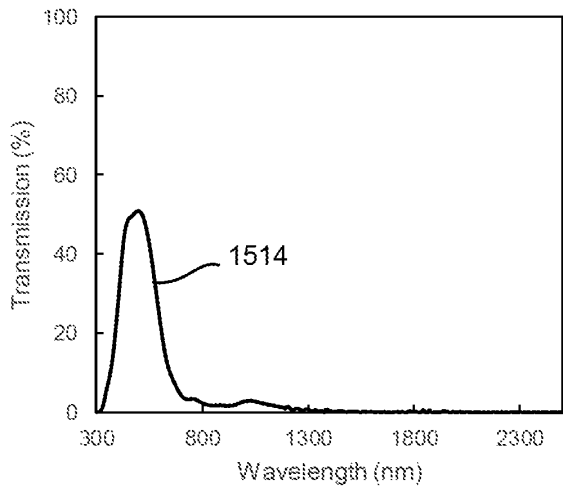


FIG. 15D

Top Electrode from Stack #	AVT (%)	T _{sol} (%)	AVT/Tsol	R _{sh} (Ω/sq)	Emissivity
1	77	81	0.95	96.2	0.530
2	77	58	1.33	7.9	0.092
3	62	31	2.00	3.8	0.060

FIG. 16

Stack #	AVT (%)	T _{sol} (%)	AVT/Tsol	Emissivity	J _{sc} (mA cm ⁻²)	V _{oc} (V)	FF	PCE (%)
1	73	66	1.11	0.206	3.23	0.81	0.46	1.22
2	67	47	1.43	0.068	5.16	0.82	0.45	1.92
3	55	24	2.29	0.056	5.99	0.82	0.44	2.21
10	38	16	2.38	0.055	20.1	0.71	0.69	9.81

FIG. 17

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Bottom electrode	Top electrode	Emissivity
70 nm ITO/8 nm MoO ₃	50 nm ITO	0.215
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/8 nm Ag/50nm HATCN	0.076
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/8 nm Ag/50nm HATCN + ebeam SiO ₂ 100nm	0.120
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/8 nm Ag/50nm HATCN + sputter SiO ₂ 100nm	0.120
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/8 nm Ag/50nm HATCN + sputter Al ₂ O ₃ 100nm	0.138
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/8 nm Ag/50nm HATCN + 3M laminate barrier	0.725
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/4 nm Ag/5 nm TPBi:C60 (75%:25%)/4 nm Ag/50 nm HATCN	0.189
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/8 nm Ag/70 nm ITO/8 nm Ag/10 nm SiO ₂	0.037
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/8 nm Ag/110 nm ITO/8 nm Ag/10 nm SiO ₂	0.036
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/12.5 nm Ag/65 nm SiO ₂	0.068
70 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/12.5 nm Ag/60 nm ITO/12.5 nm Ag/10 nm SiO ₂	0.056
10 nm ITO/10 nm Ag/ 10 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/12.5 nm Ag/65 nm SiO ₂	0.062
10 nm ITO/10 nm Ag/ 10 nm ITO/8 nm MoO ₃	5 nm TPBi:C60 (75%:25%)/10 nm ITO/12.5 nm Ag/60 nm ITO/12.5 nm Ag/10 nm SiO ₂	0.057

FIG. 18

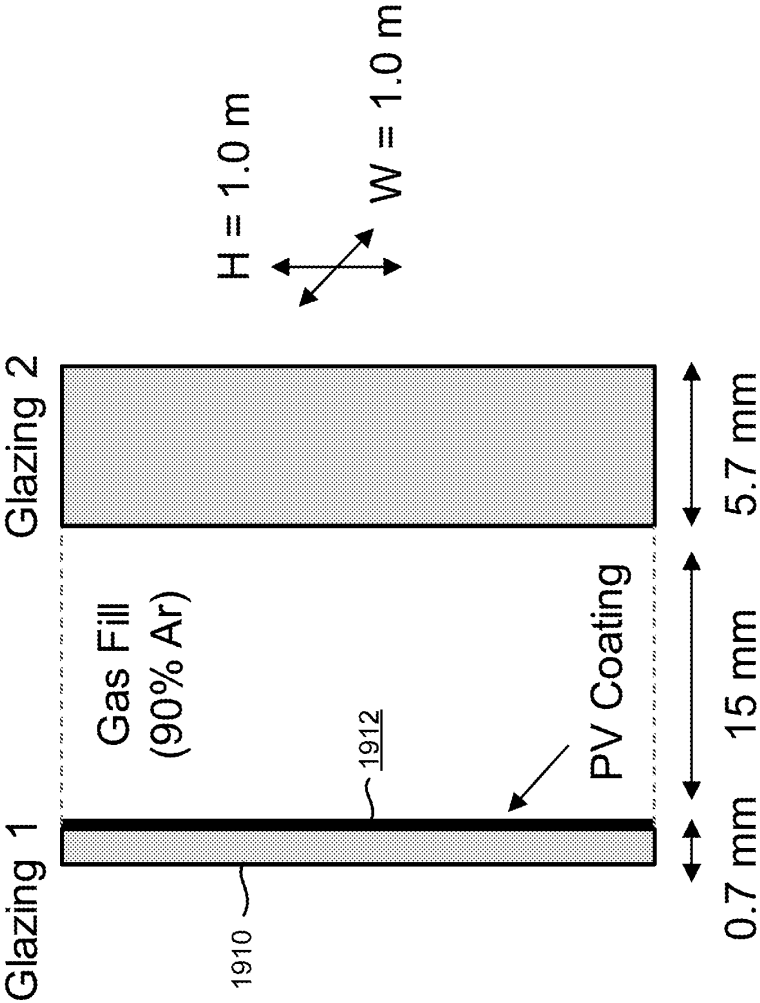


FIG. 19A

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Stack #	PV Type	Bottom Electrode	Top Electrode	AVT (%)	SHGC (%)	Selectivity
1	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO (5/50nm)	67	63	1.07
2	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO/Ag/SiO ₂ (5/10/12.5/65nm)	61	43	1.42
3	OPV	ITO/MoO ₃ (70/8nm)	TPBi:C60/ITO/Ag/ITO/Ag/SiO ₂ (5/10/12.5/60/12.5/10nm)	53	24	2.19
4	OPV	ITO/Ag/ITO/MoO ₃ (10/5.5/10/8nm)	TPBi:C60/ITO/Ag/SiO ₂ (5/10/12.5/65nm)	55	40	1.38
5	OPV	ITO/Ag/ITO/MoO ₃ (10/5.5/10/8nm)	TPBi:C60/ITO/Ag/ITO/Ag/SiO ₂ (5/10/12.5/60/12.5/10nm)	47	23	2.06
6	CIGS	ITO (70nm)	ZnO/ITO (10/50nm)	54	54	1.01
7	CIGS	ITO (70nm)	ZnO/Ag/ITO/Ag/SiO ₂ (10/14.5/80/14.5/10nm)	37	18	2.05
8	MAPbI ₃	ITO/Spiro-OMeTAD (70/20nm)	TiO ₂ /ITO (10/50nm)	47	53	0.88
9	MAPbI ₃	ITO/Spiro-OMeTAD (70/20nm)	TiO ₂ /Ag/ITO/Ag/SiO ₂ (10/14.5/80/14.5/10nm)	33	17	1.93
10	OPV	ITO/PEDOT:PSS (70/40nm)	TPBi:C60/Ag/HATCN/TAPC/ TPBi:C60/Ag/TAPC (5/14/45/50/5/14/60nm)	43	19	2.25

FIG. 19B

Stack #	AVT (%)	SHGC (%)	Selectivity
1	66	62	1.06
2	61	44	1.38
3	49	23	2.13
10	34	17	1.98

FIG. 19C