

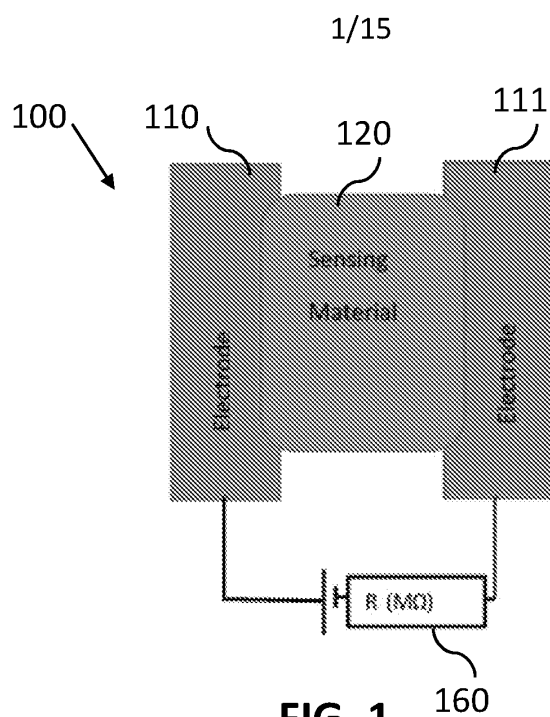


FIG. 1
(Prior Art)

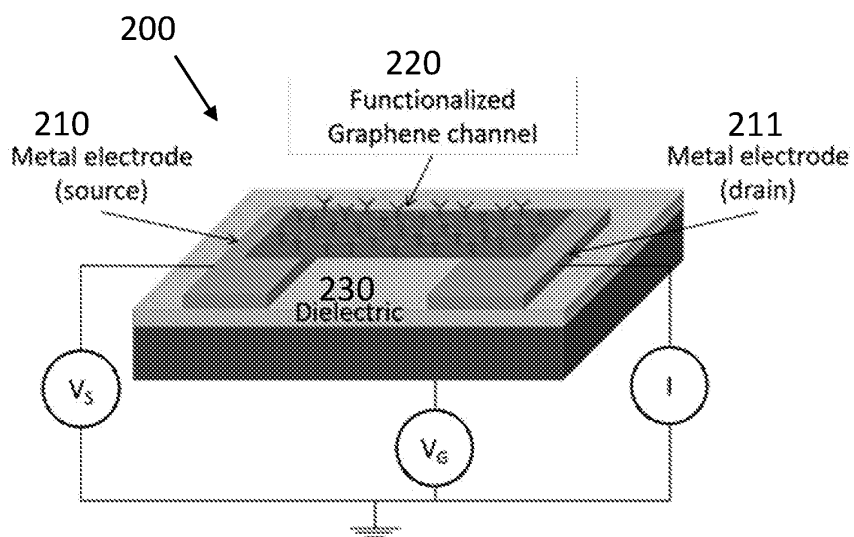


FIG. 2
(Prior Art)

Table 1. Gas sensors based on graphene. G = Graphene; FET = field effect transistor; rGO = reduced graphene oxide; RT = room temperature; ppm = parts per million; ppt = parts per trillion.

St. No.	Graphene Hybrid	Type of Sensor	Target Gas	Temperature (°C)	Detection Range (ppm)	LOD	Response (Sensitivity)	Response Time	Recovery Time	Reference
1	EpiGd-G	Chemiresistor	NO ₂	RT	0.2 ppt-1 ppm	0.6 ppt	-	-	-	[11]
2	G-oxide treated	Chemiresistor	NO ₂	RT	0.2-300	1.3 pptb	17% (200 ppm)	-	-	[14]
3	G-oxidized	Chemiresistor	NO ₂	RT	100 and 500	-	9% (100 ppm)	-	-	[15]
4	Graphene-G	Chemiresistor	NO ₂ /NH ₃	RT	1-10/5-100	15/160 pptb	4.32%/0.71%	5-7 min/-	-	[16]
5	rGO	FET	NH ₃	40-100	10-1000	-	1%-38%	~0-12 min	-	[17]
6	G-microfiber	Optical	NH ₃	-	0-500	0.3 ppm	-	~0.4 s	-	[18]
7	rGO	Chemiresistor	CO ₂	RT	0-1500	-	77% (1500 ppm)	~4 min	~4 min	[19]
8	Graphene sheets	Conductivity sensor	CO ₂	22-40	10-100	-	9%-25%	8 s	10 s	[20]
9	rGO	Chemiresistor	H ₂	30-300	200	-	6%-17% (200 ppm)	~11 s	~36 s	[21]

FIG. 3
(Prior Art)

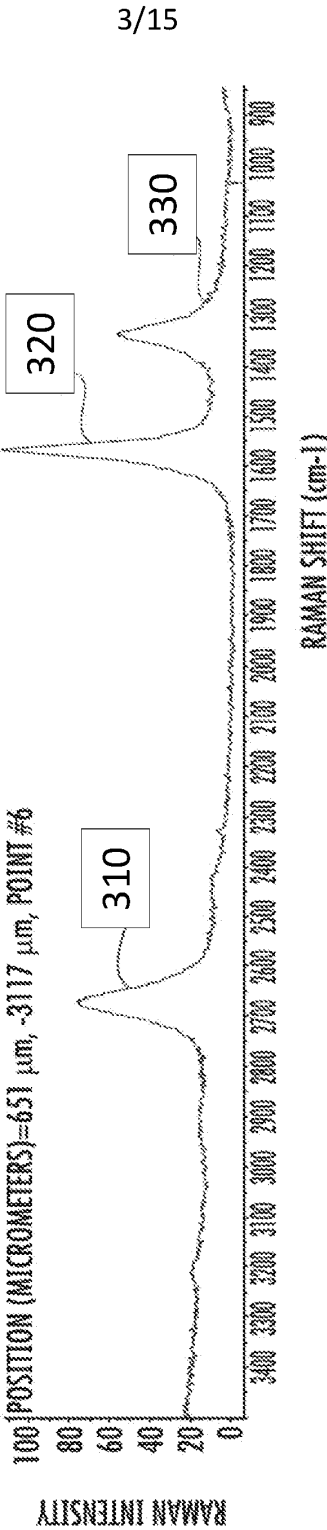


Fig. 4

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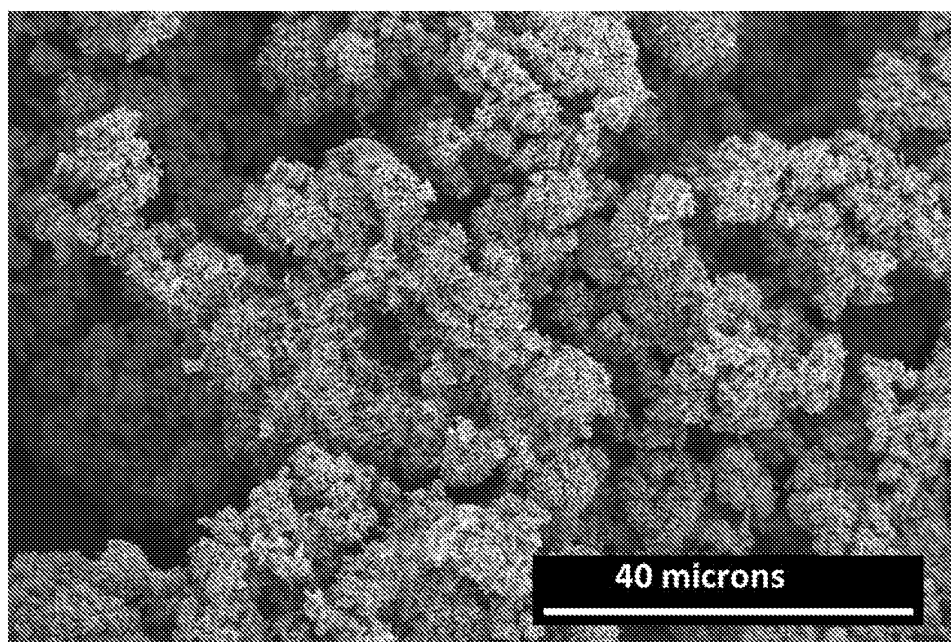


Fig. 5A

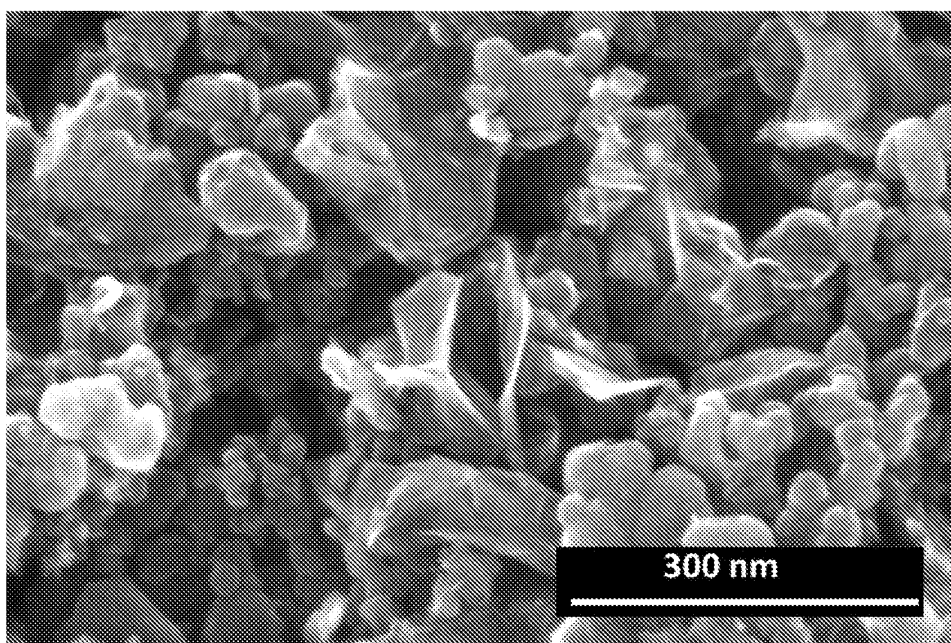


Fig. 5B

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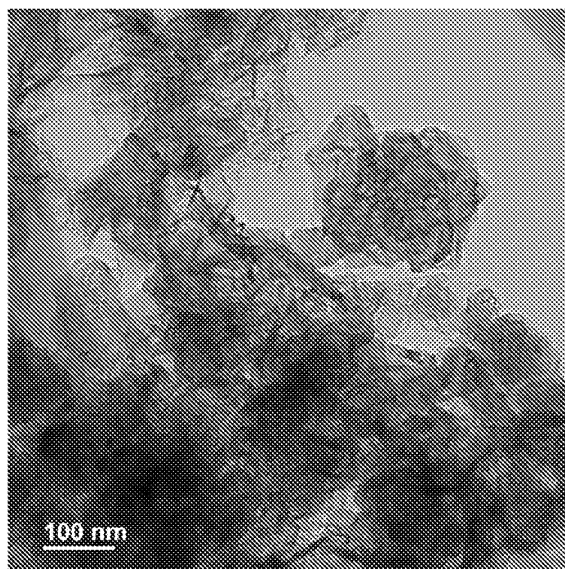


Fig. 6A

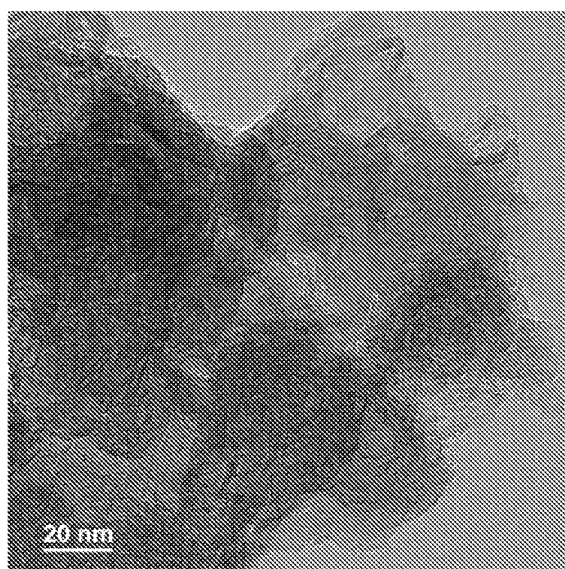
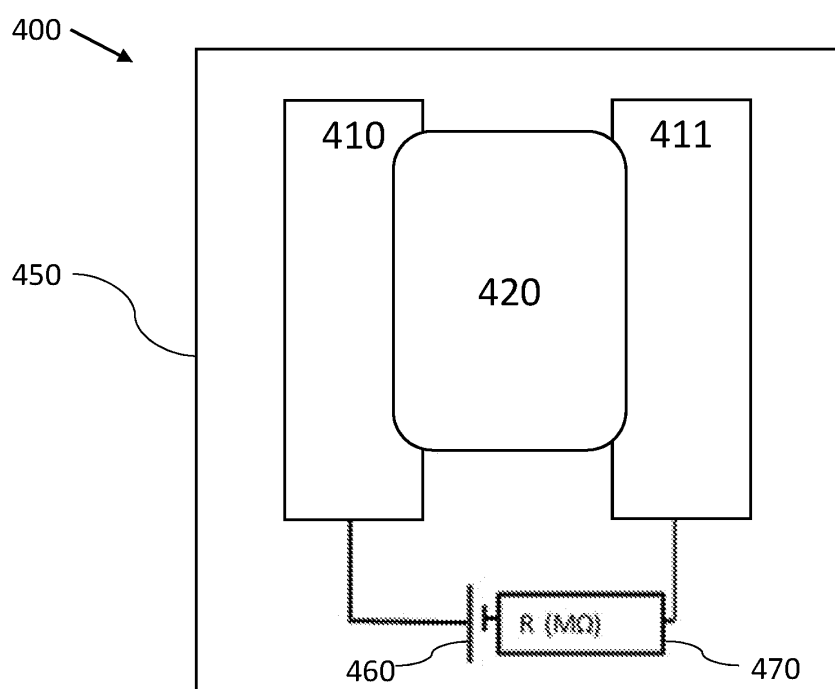


Fig. 6B

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**FIG. 7**

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Family	Name
Metallocenes	Ferrocene
	Cobaltacene
	Ferrocenium
	Cp*2Fe(II)
Chelatases	Iron porphine
	Vitamin B12
Coordination compounds	Ru(Bipy)3
	dicyanobis(ethylenediamine)cadmium(II)
Organics	NADH
	Tetracyanoquinodimethane
	Tetramethyl-p-phenyldiamine
	Cyanocobalamin
	Tetrathiafulvalene
Polymers	TEMPO
	PTMA
	PVFCN

FIG. 8

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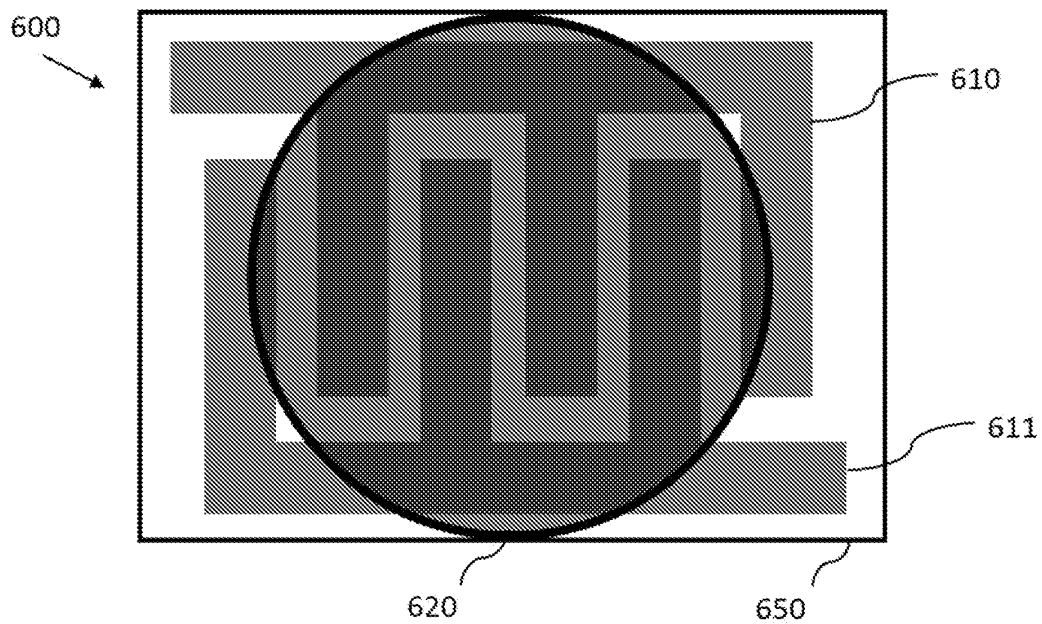


FIG. 9

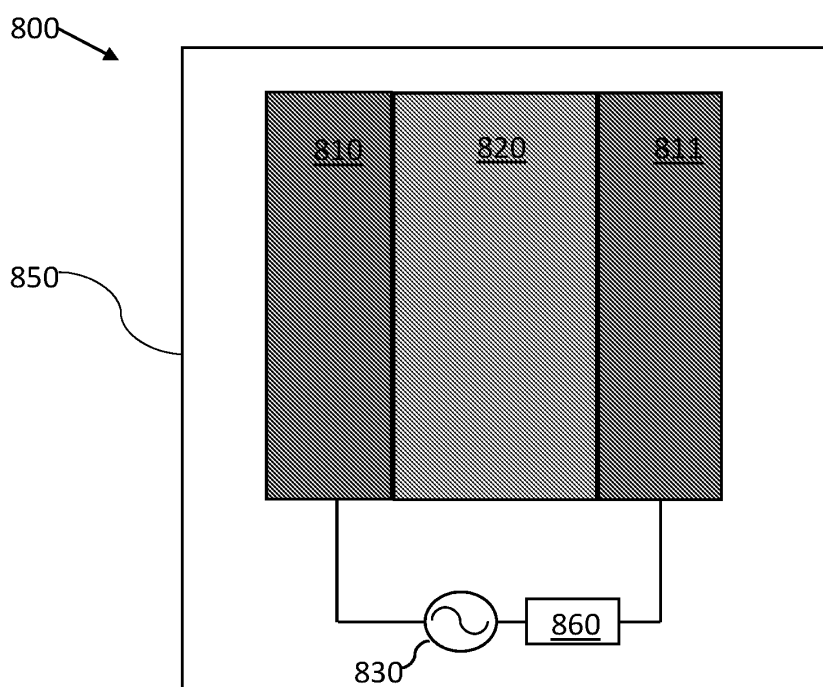


FIG. 10

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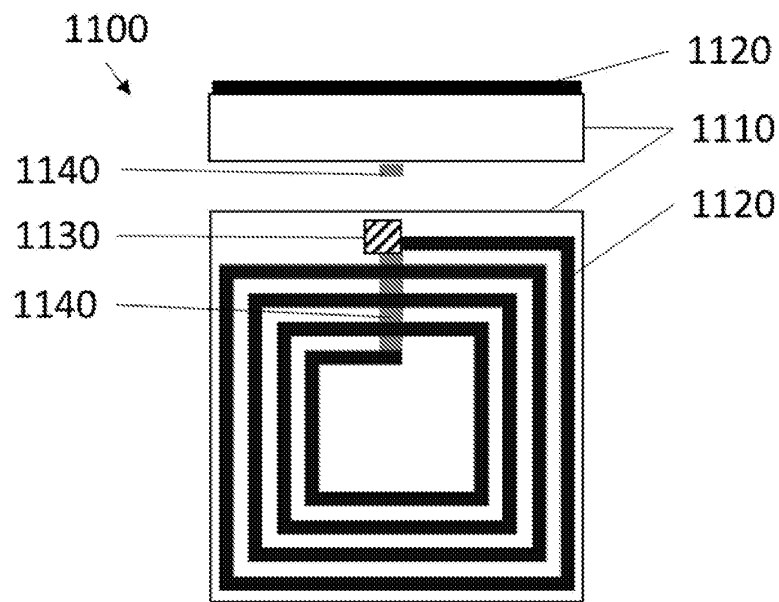


FIG. 11A

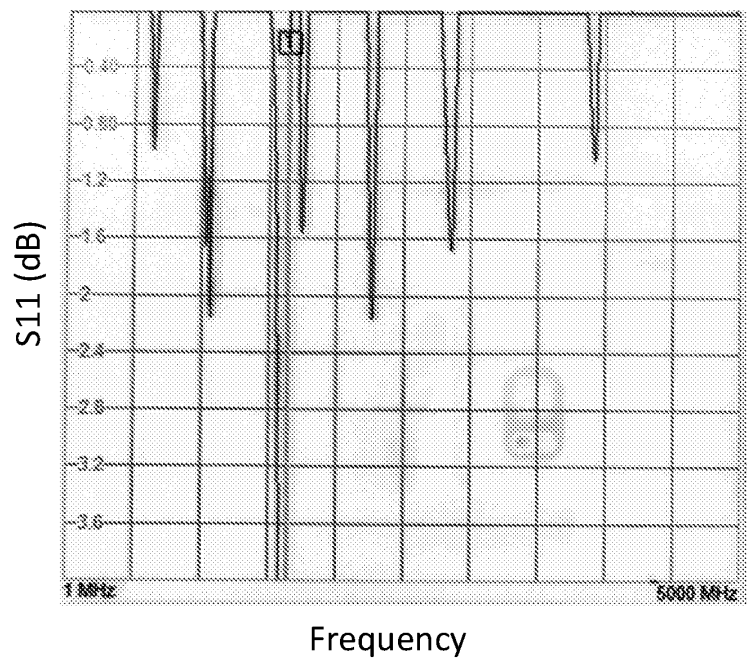


FIG. 11B

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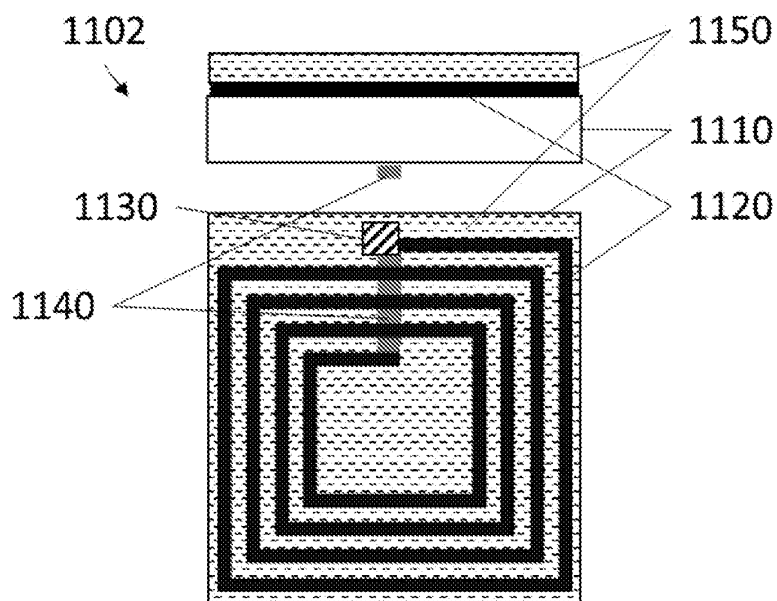


FIG. 11C

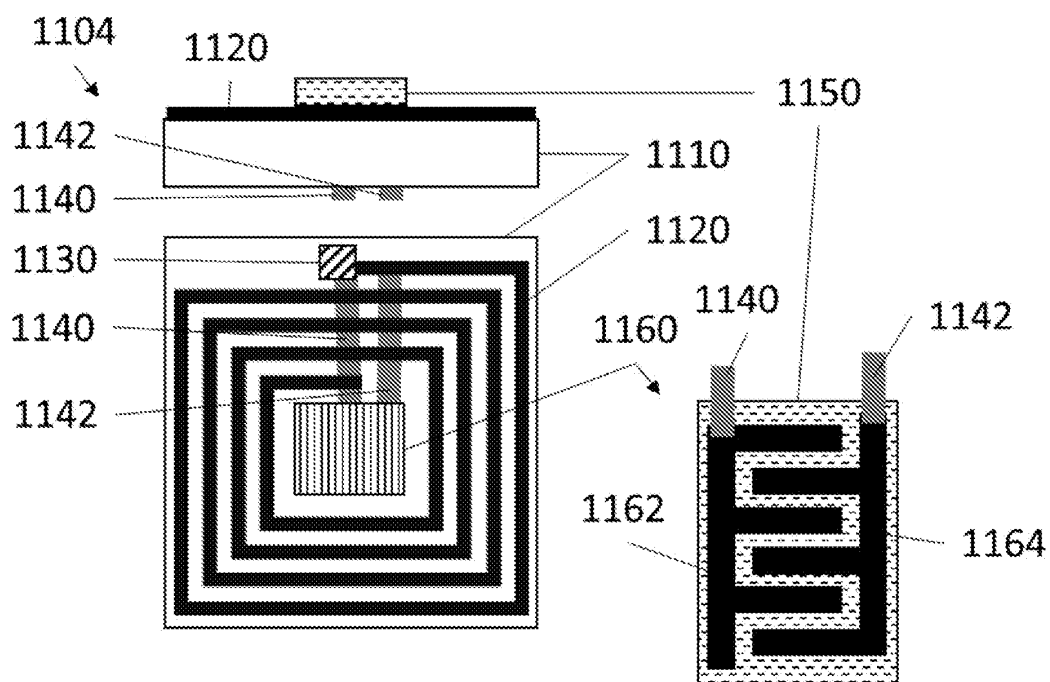


FIG. 11D

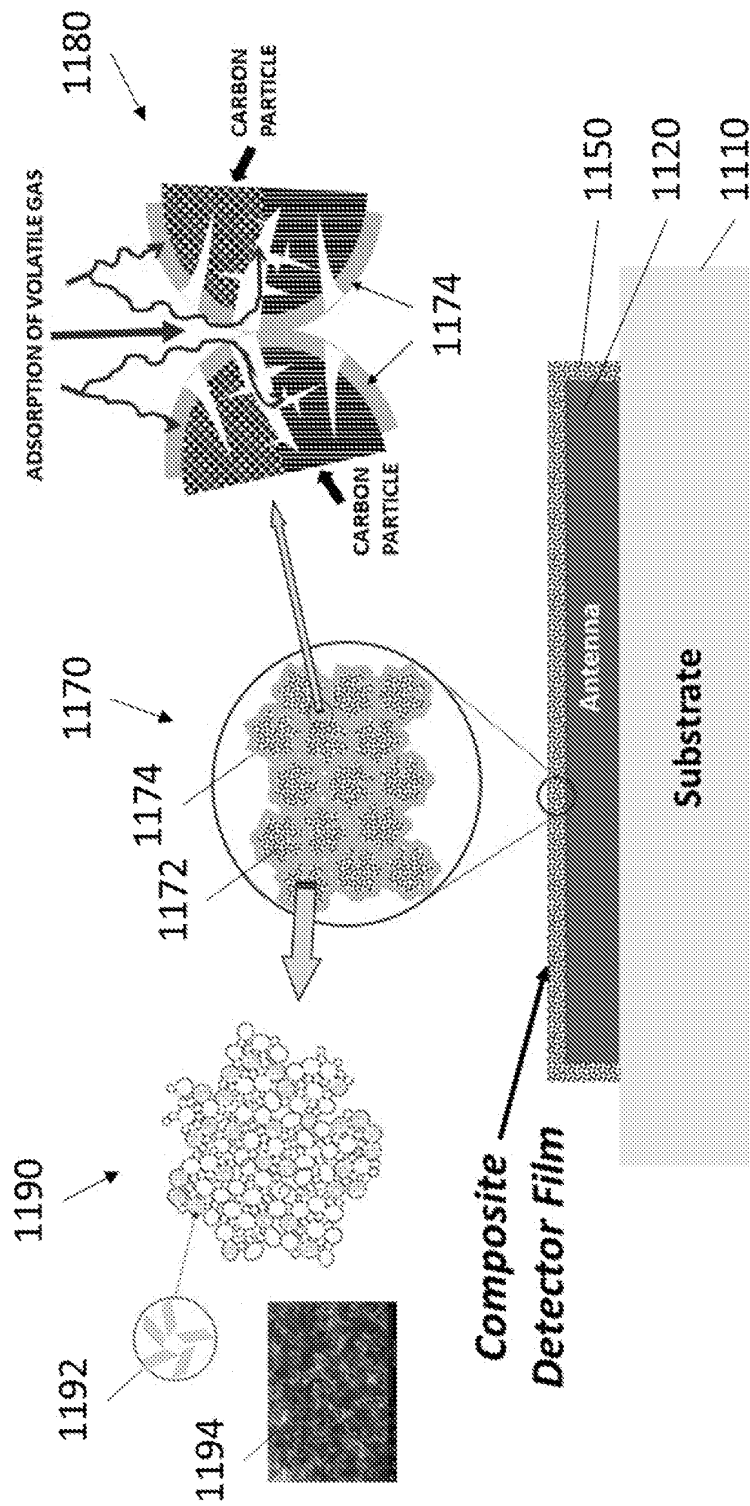


FIG. 11E

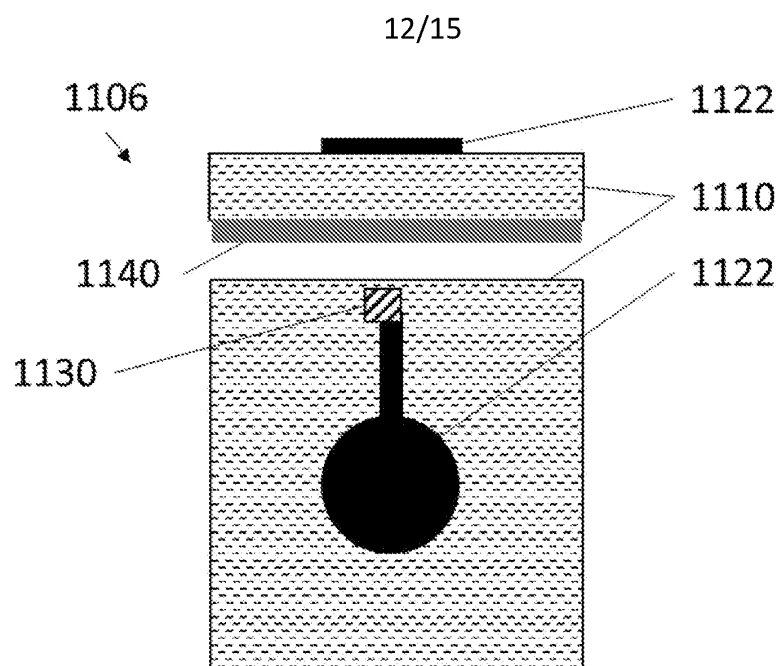


FIG. 11F

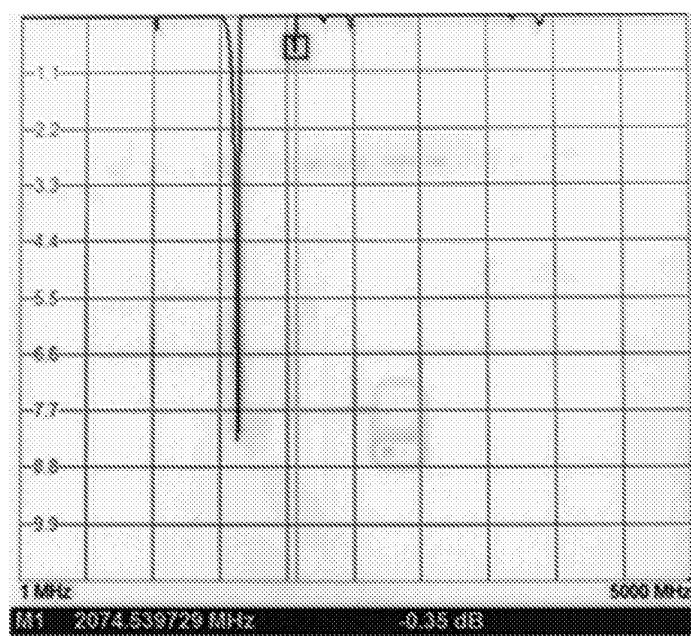
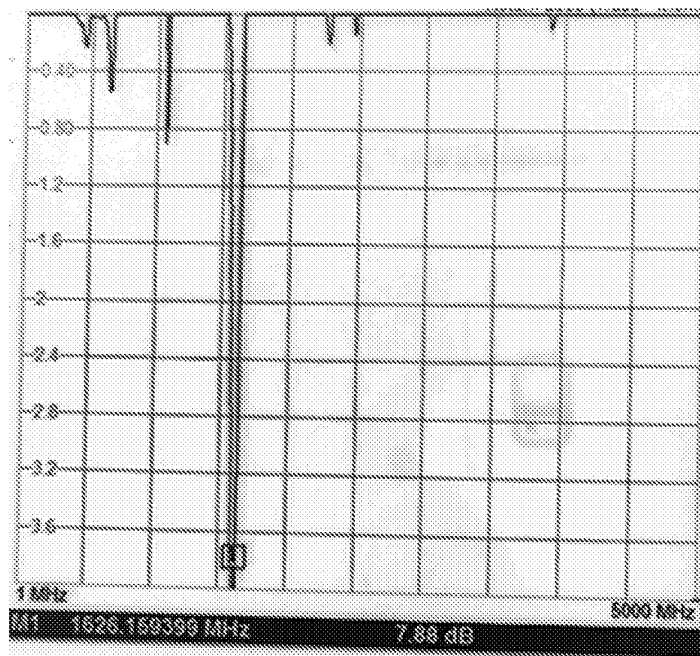
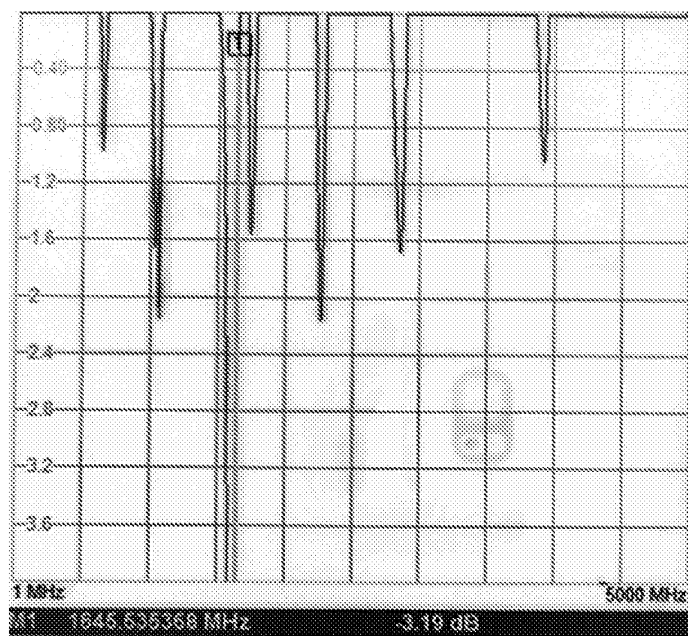
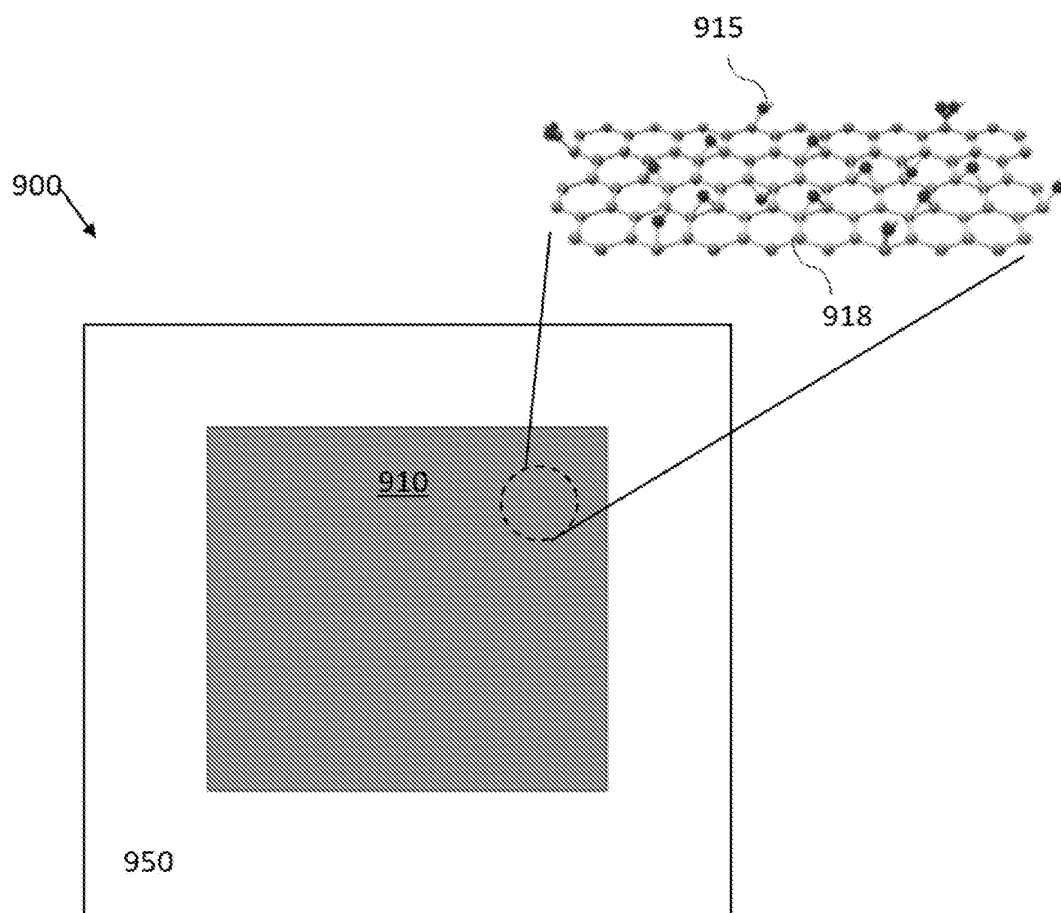


Fig. 12A

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**Fig. 12B****Fig. 12C**

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**FIG. 13**

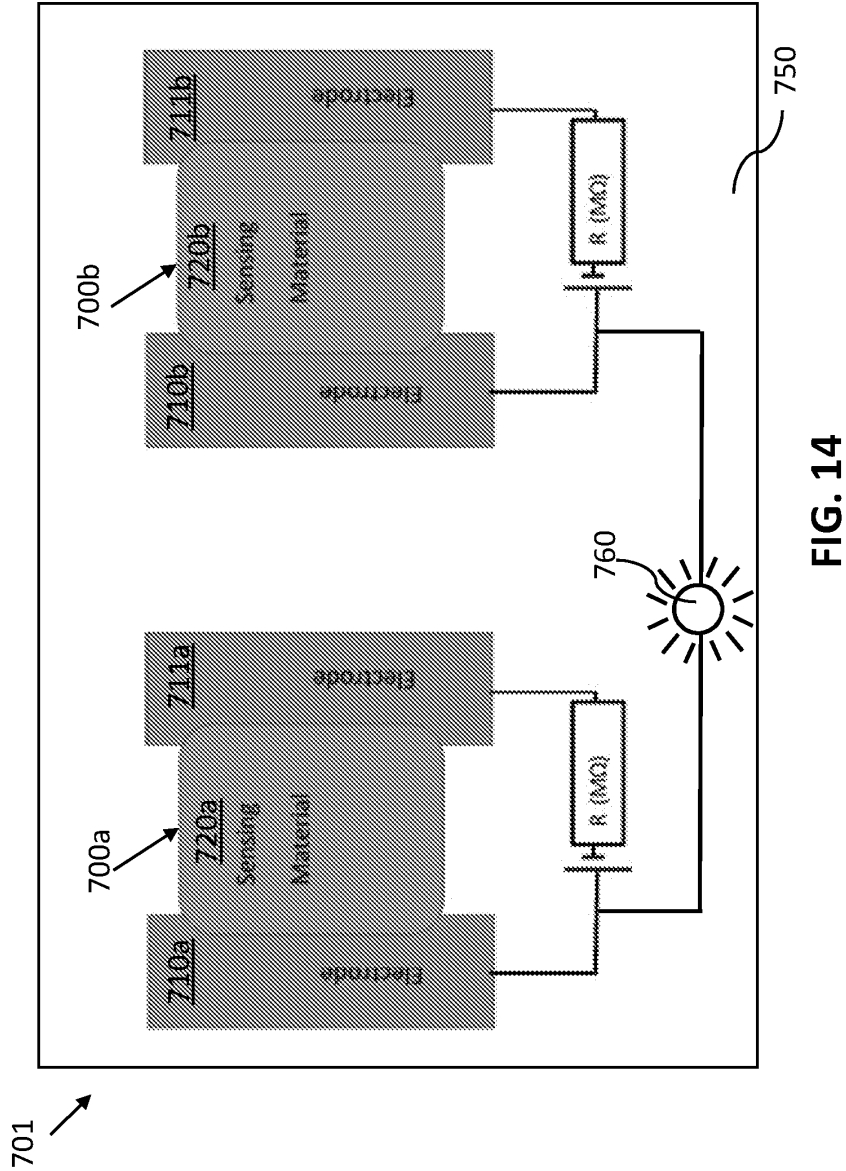


FIG. 14