Supporting Information

"Synergistic Effect" based novel and ultrasensitive approach for the detection of serotonin using DEM modulated bimetallic nanosheets

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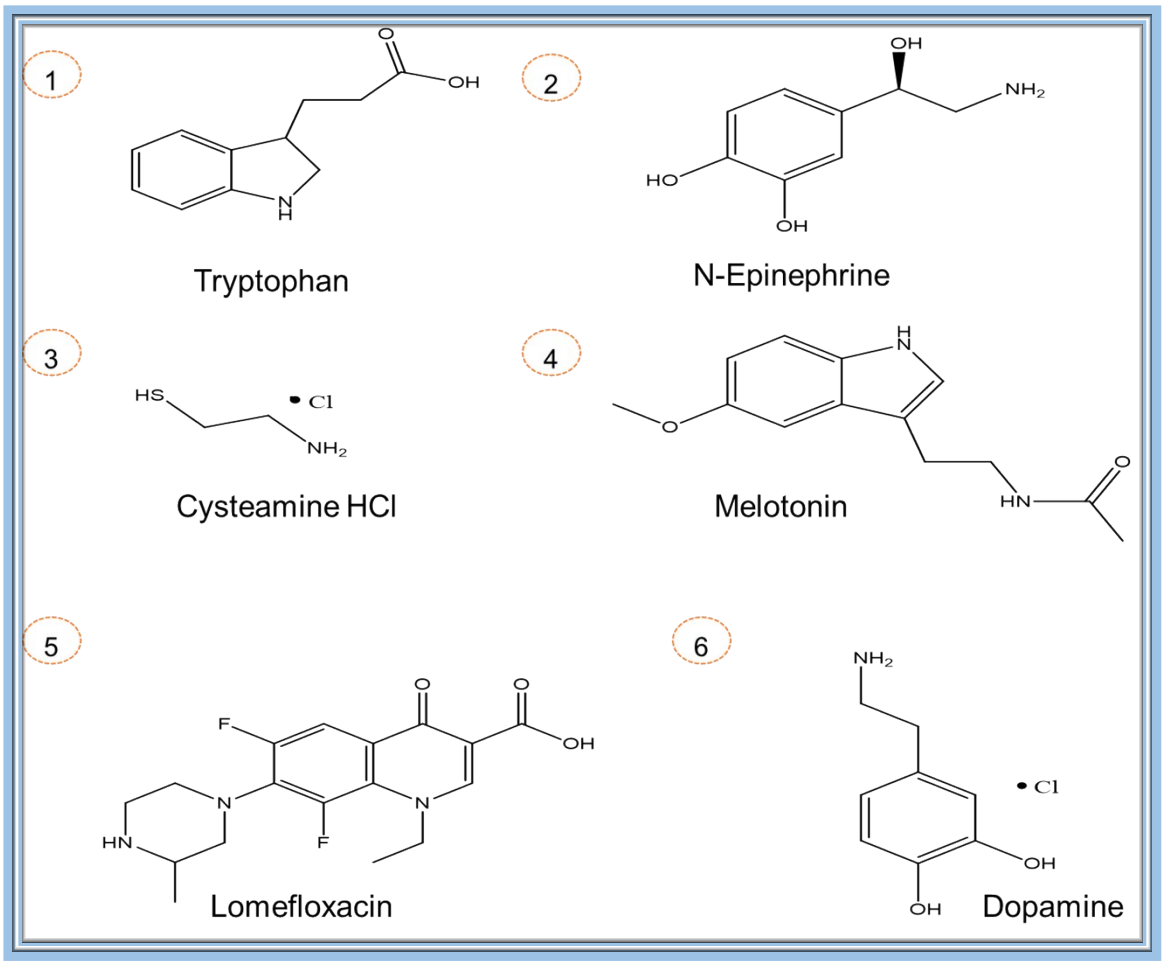

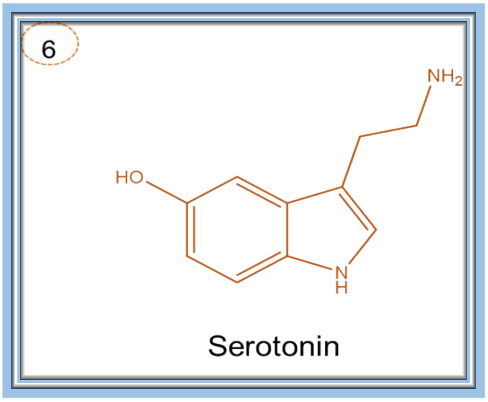

Figure S1. Chemical structure of monoamines and neurotransmitters used in this study.

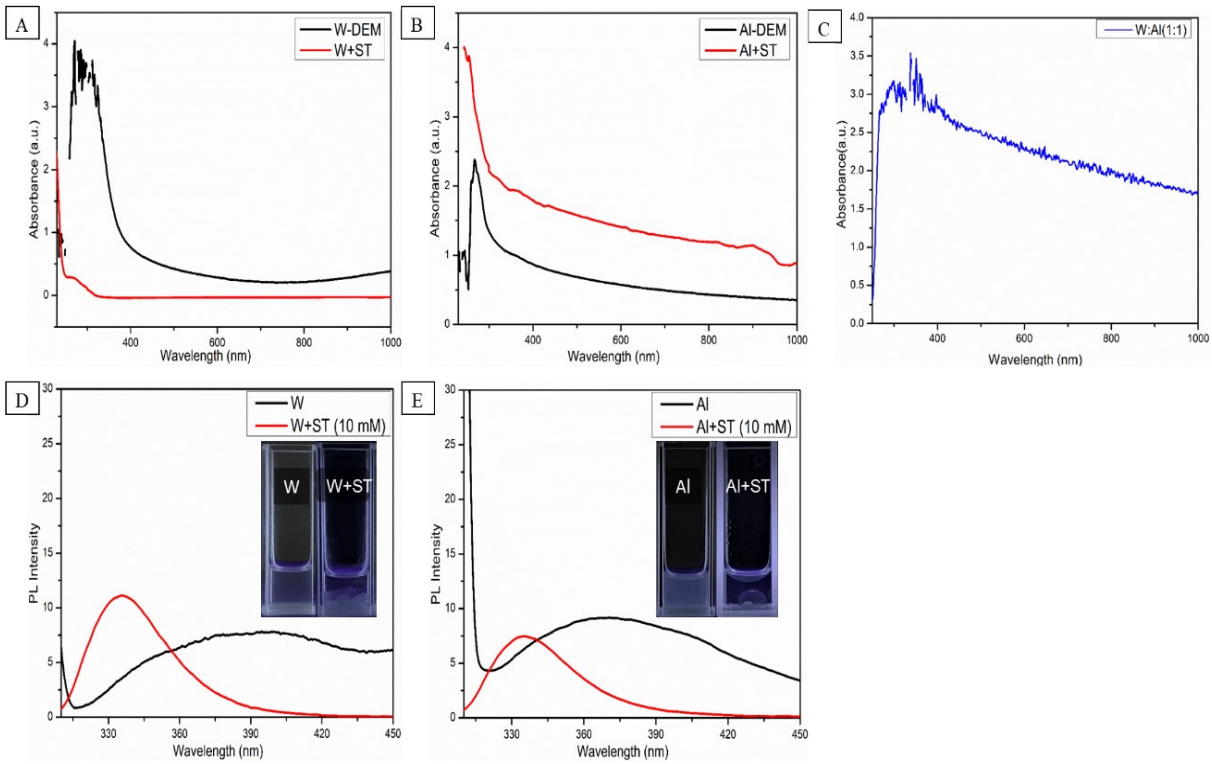

Figure S2. UV absorption studies **(A)** for only W and W with ST **(B)** only Al and Al with ST **(C)** W-Al with 1:1 ratio. PL spectra for **(D)** only W (DEM) and W (DEM) with ST **(E)** only Al (DEM) and Al (DEM) with ST

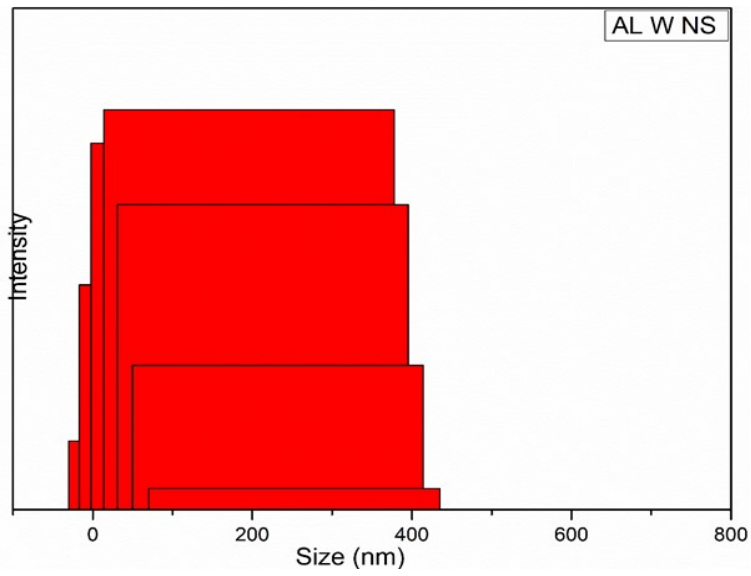

Figure S3. DLS size of newly synthesize Al-W nanosheets.

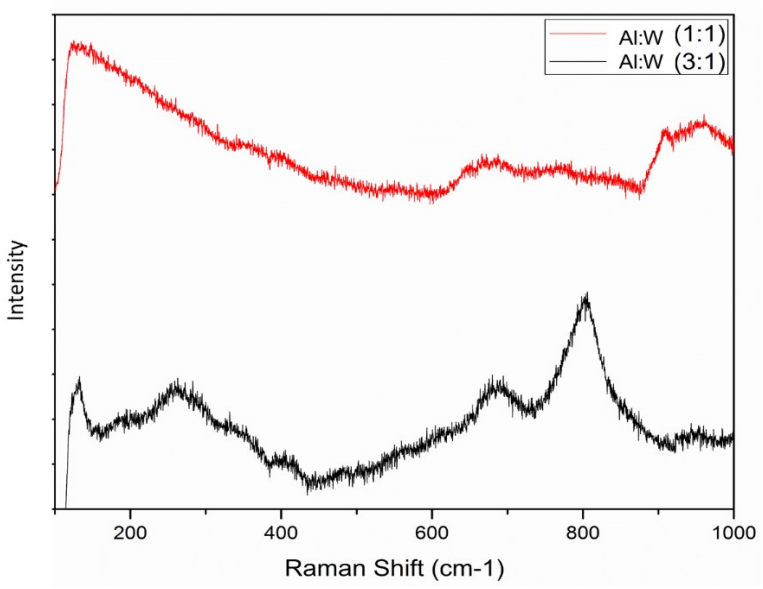

Figure S4. Raman studies of different ratio of moles of Al and W to synthesize Al-W nanosheets.

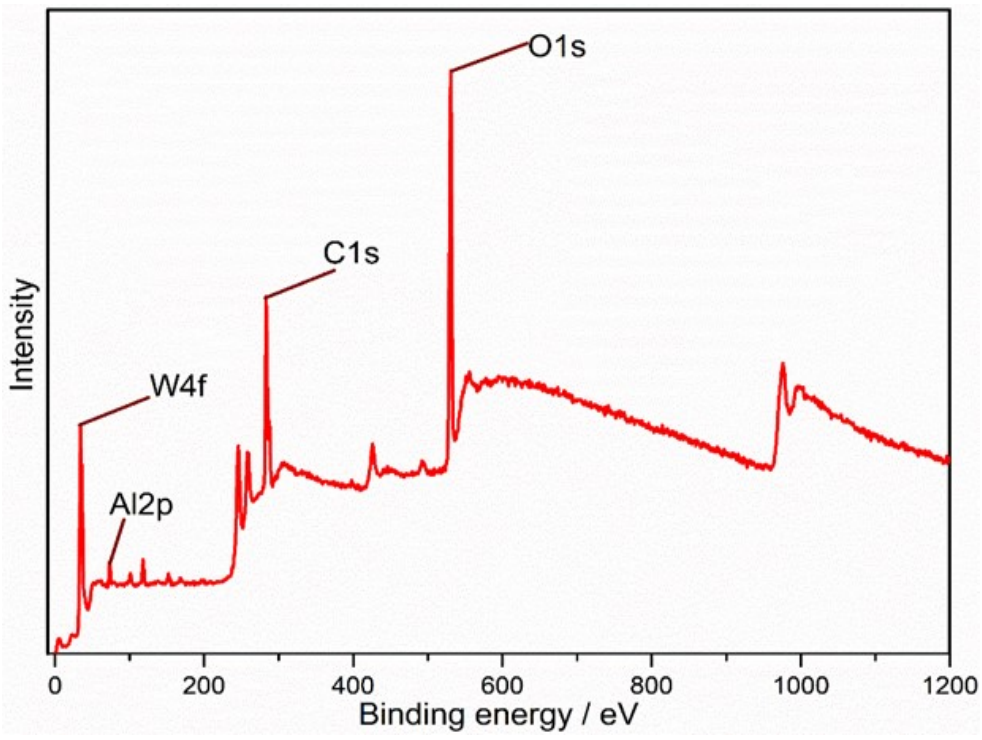

Figure S5. XPS Survey Scan of Al-W nansosheets.

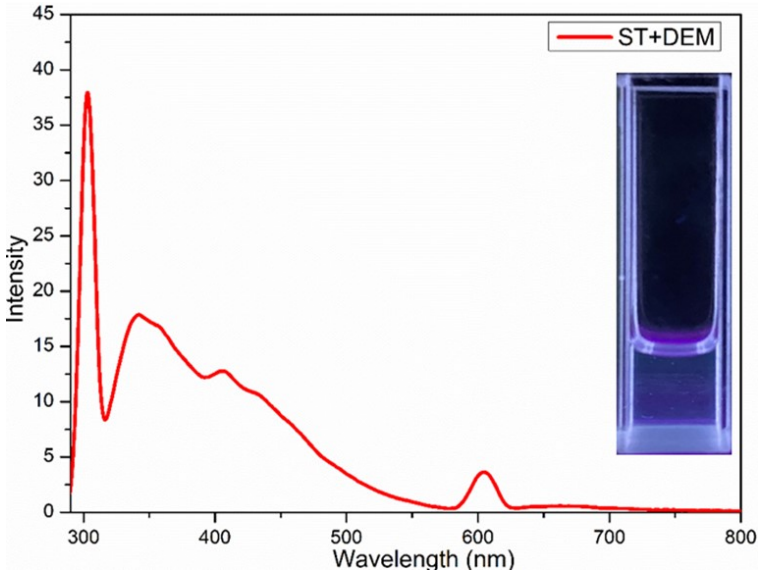

Figure S6. Fluorescence spectra for the control studies of Serotonin in DEM Solvent.

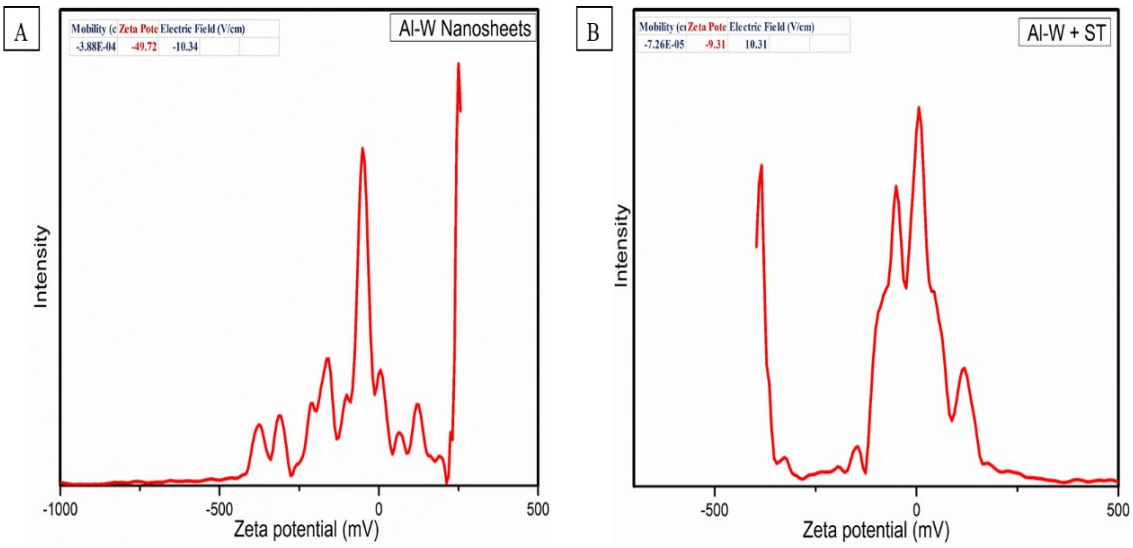

Figure S7. Zeta potential studies **(A)** for Al-W nanosheets **(B)** and Al-W+ST.

Table S1. Comparative studies between previous methods and developed method for the detection of Serotonin

Analyte	**Probe**	**Linear range**	**Method**	**LOD**	**Ref**
Ln-MOF	ST	1.9 - 270 µM	PL	0.66 µM	[1]
EuUPDC	ST	0.05 - 6.54 µM	PL	0.05 µM	[2]
Ti3C2Tx-reduced graphene oxide	ST	0.025-147 µM	EC	10 nM	[3]
Tb3þ-NOTT-220	ST	0–200 µM	PL	0.57 µM	[4]
Mn-doped zinc sulphide (ZnS) QDs@SiO2@MIPs	ST	50 to 500 ng/ml,]	PL	0.69 ng/ml	[5]
3,3-dithio-bis-(sulfosuccinimidyl)propionate (DTSP) modified AuNPs	ST	100-300 nM	Colorimetric	2.6 nM	[6]
PEDOTNTs/rGO/Ag NPs	ST	1-0.5 mM	transducer	0.1 nM	[7]
Al-W Nanosheets	ST	10nm-1mM	PL	0.05nM	This work

55 **Table S2.** Comparison of previous literature with the new developed method for the
56 real sample analysis for serotonin

Analyte	**Probe**	**Linear range**	**Method**	**LOD**	**Sample**	**Ref**
QDs@SiO_2@MIPs	5-HT	50 -500 ng/mL	PL	0.69 ng/mL	Human serum	[5]
AuNPS	5-HT	0-3 µM	PL	0.12 nM	Human serum	[8]
Tf-Au NCs	5-HT	0.2 -50 µM	PL	0.049µM	Human serum	[9]
Pt coated carbon modified GCE	5-HIAA	0.01– 100 µM	GCE	20 nM	Urine	[10]
AuAg nanoalloy-graphene nanosheets	ST	2.7 nM-4.82 µM	GCE	1.6 nM	Blood serum	[11]
Fe3O4@Au@SiO2 coated MIP	ST	0.01– 1000 µM	LSV	0.002 µM a	Urine	[12]
Al-W Nanosheets	ST	10nm-1mM	PL	0.05nM	Urine and Blood serum	This work

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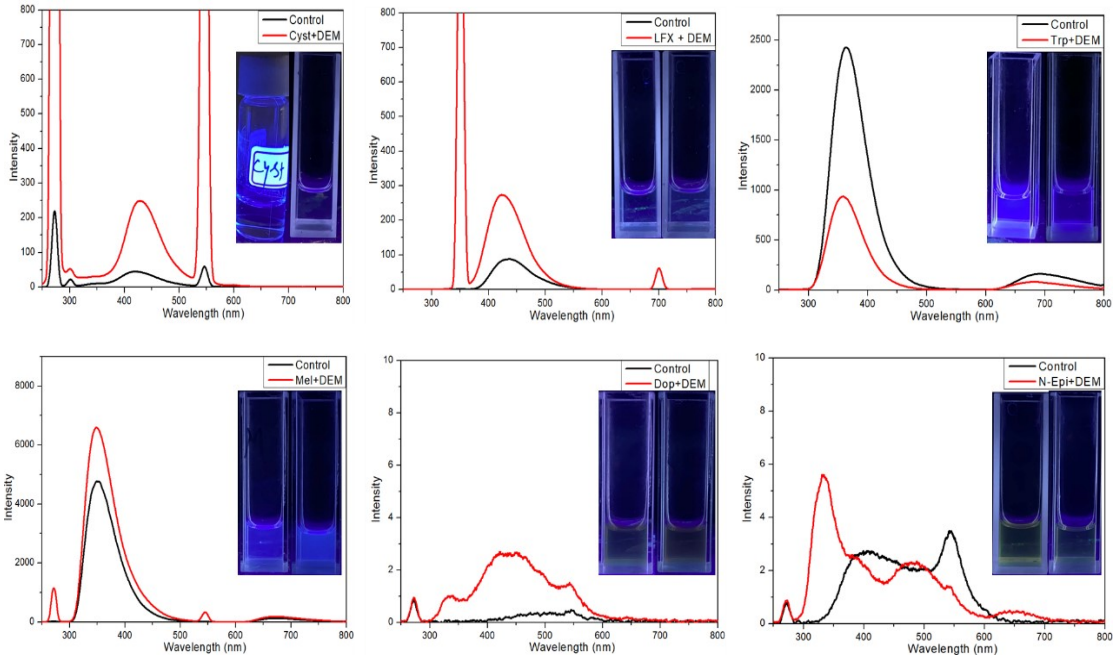

Figure S8. PL Emission studies for different neurotransmitters.

Sample	Concentration of ST (uM)	Recovery (%)
Human Urine	0.5	104.12
	1	99.91
	5	90.4
	10	94
Blood Serum	0.5	102.82
	1	108.34
	5	100.25
	10	106.66

Figure S9. Recovery results of biosensor in real samples.

References

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molecularly imprinted polymers coated Fe3O4@ Au@ SiO2 for serotonin determination. Analytica chimica acta, 2019. **1077**: p. 255-265.