Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

One-drop chemosensing of Dapoxetine using opto-analysis by multi-channel *μ*PCD decorated silver nanoparticles: Introducing a portable device toward naked-eye biomedical analysis

Farnaz Bahavarnia [a], Fereshteh Kohansal [b], Mohammad Hasanzadeh [c,*]

[a] Nutrition Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[b] Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[c] Pharmaceutical Analysis Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

Corresponding Author
* (Mohammad Hasanzadeh) Pharmaceutical Analysis Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. E-mail address: (*) hasanzadehm@tbzmed.ac.ir;

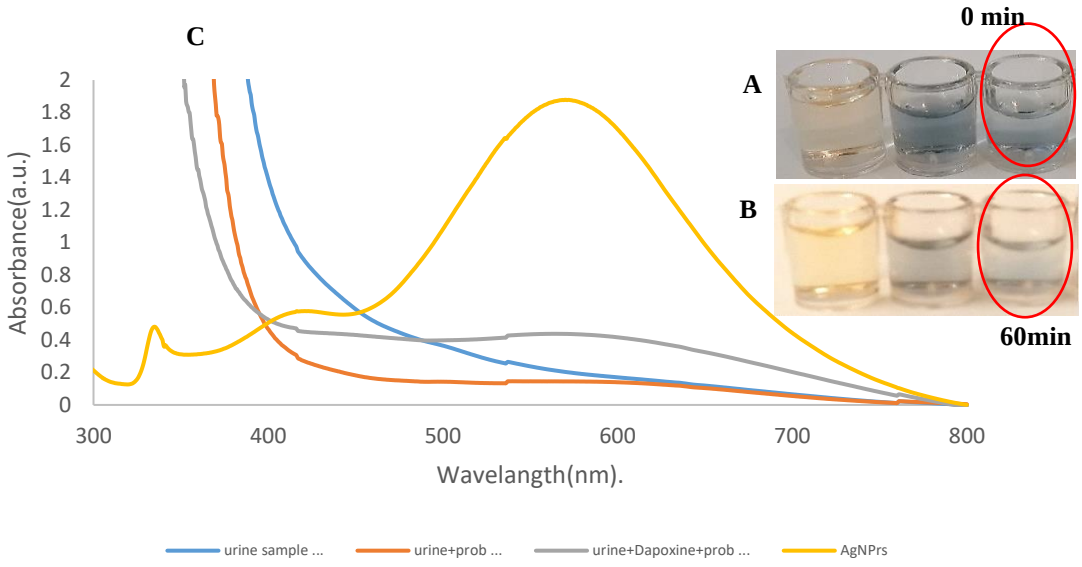


Fig. S1. (A) Colorimetric sensing of Urine, Urine + AgNPrs, DPX+Urine, AgNPrs, AgNPrs a 1 : 1 ratio and 1:0.5:0.5.at 0 min . **(B)** Colorimetric sensing of Urine, Urine + AgNPrs, DPX+Urine,AgNPrs, AgNPrs a 1 : 1 ratio and 1:0.5:0.5**.** a t6 0 min**. (C)** UV-Vis spectra, Urine, Urine + AgNPrs, DPX+Urine,AgNPrs, AgNPrs a 1 : 1 ratio and 1:0.5:0.5**.**

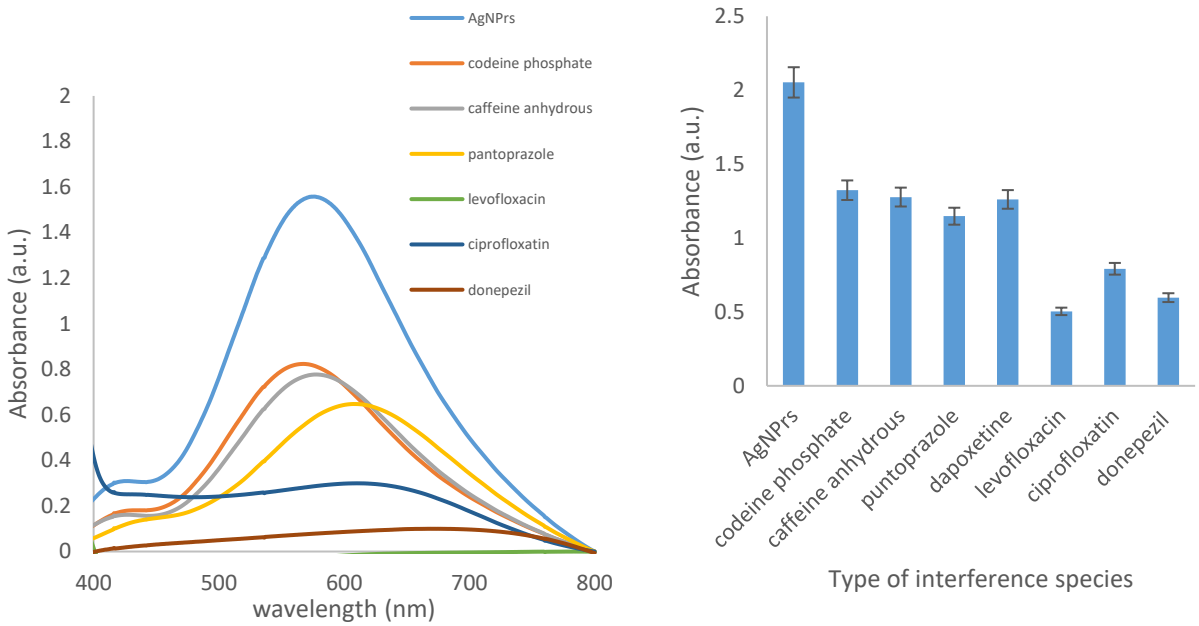


Fig. S2: (A) UV-Vis absorption spectra of AgNPrs, AgNPrs + Drugs (10mM) and **(B)** Histogram of peak intensity versus of AgNPrs, AgNPrs + Drugs (10mM) in0 min

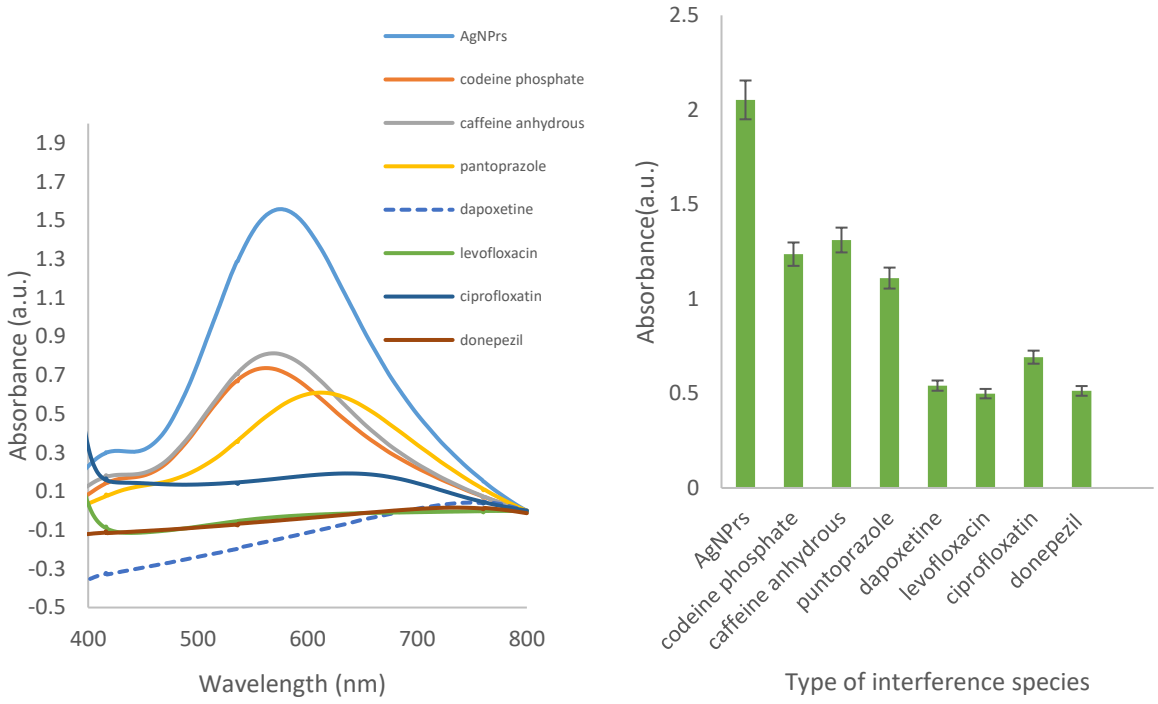
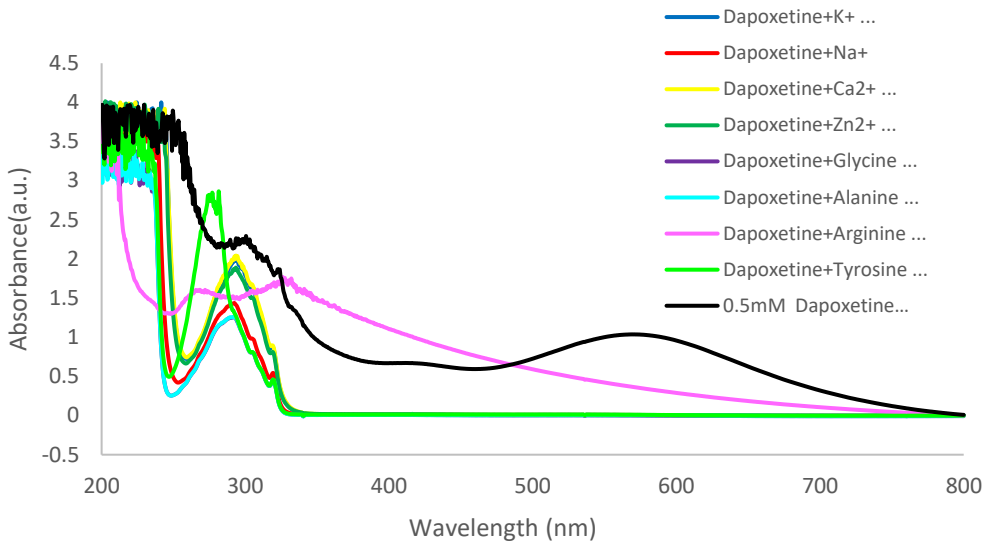


Fig. S3: A) UV-Vis absorption spectra of AgNPrs, AgNPrs + Drugs (10mM) and **B)** the histogram curve of peak intensity versus of AgNPrs, AgNPrs + Drugs (10mM) in60 min

A

0 min

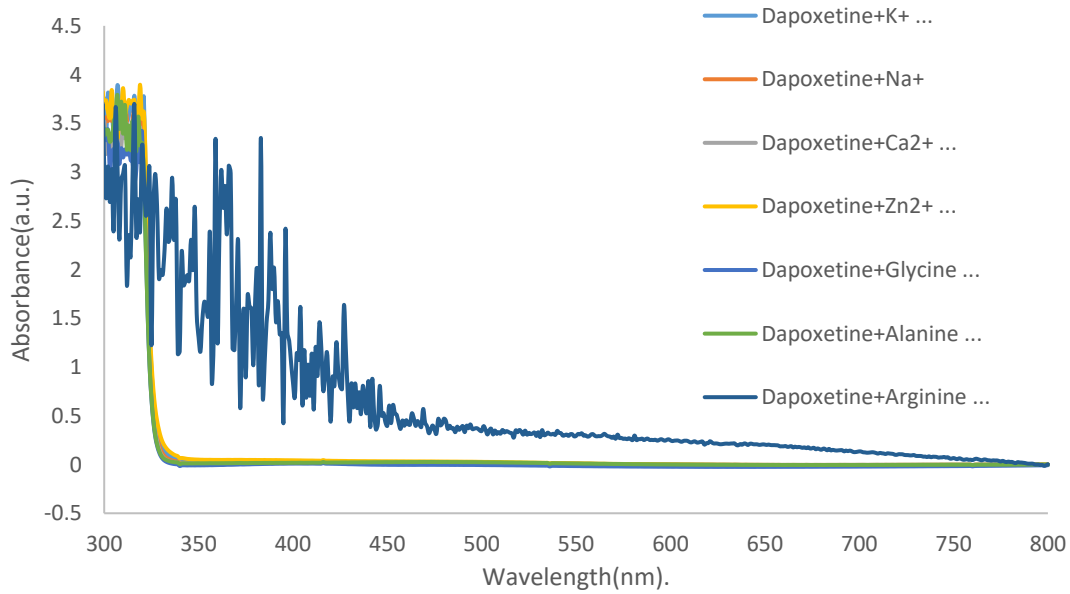
B



C

60 min

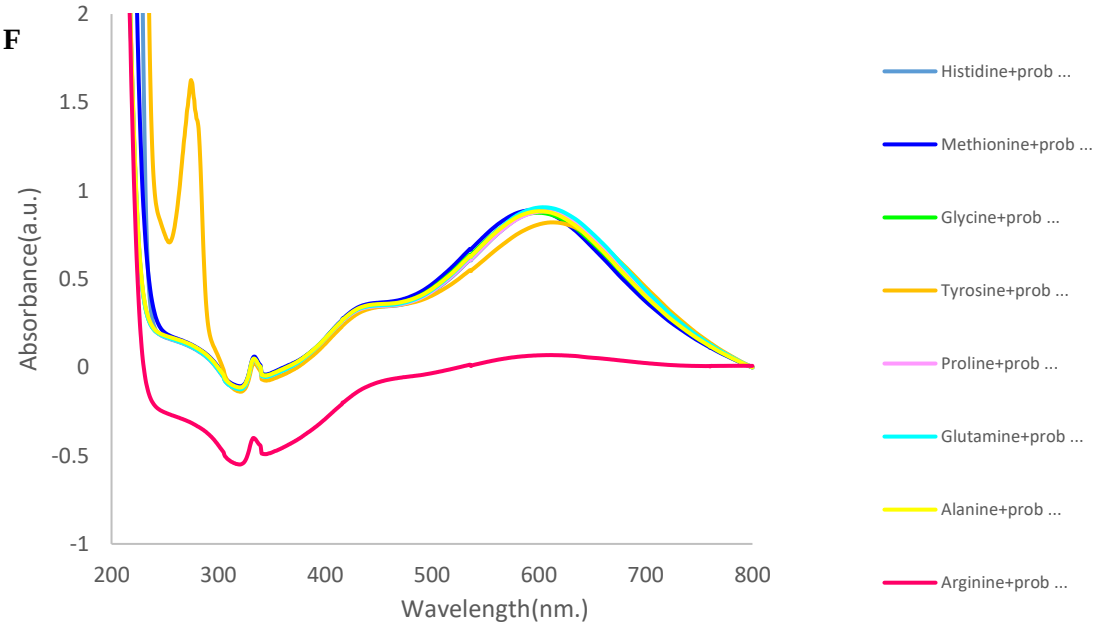
D



E

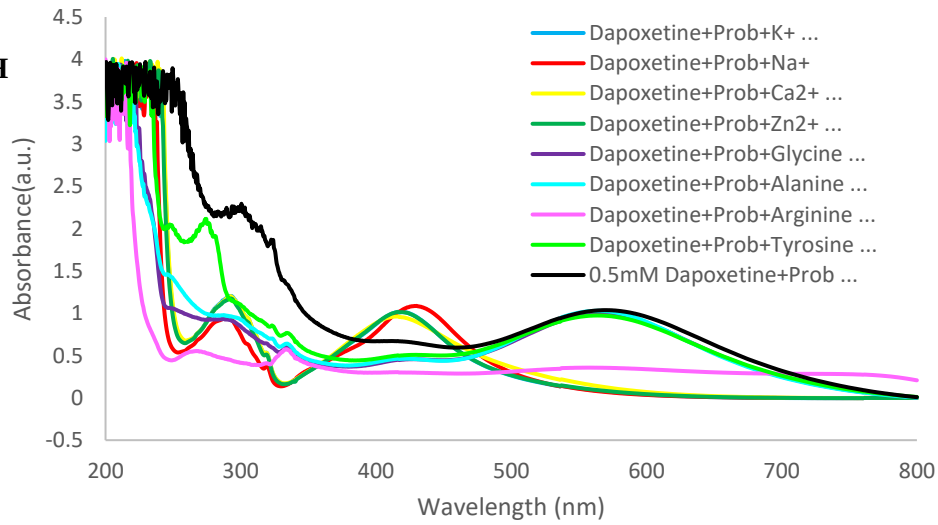
0 min **60 min**

F

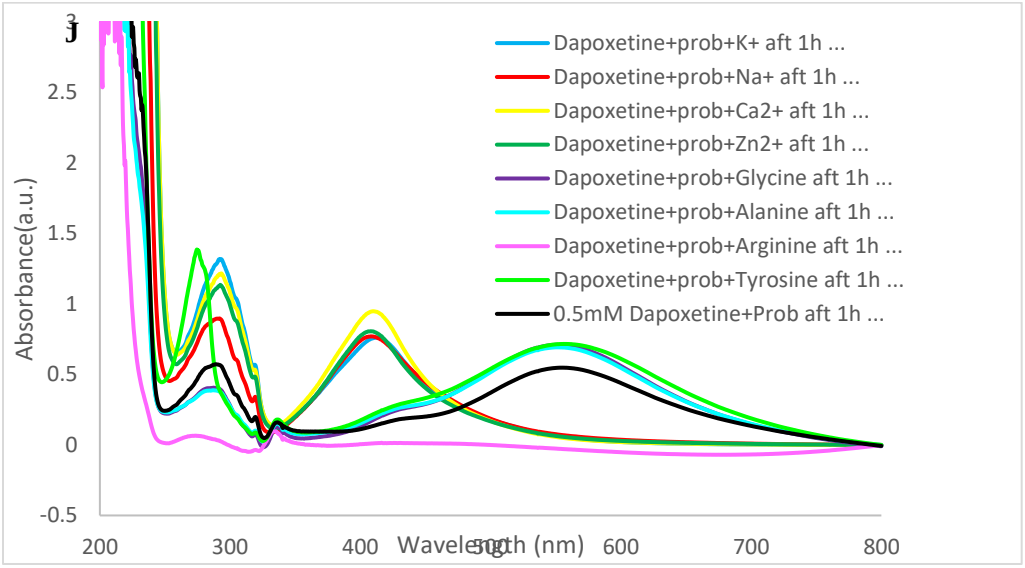


G

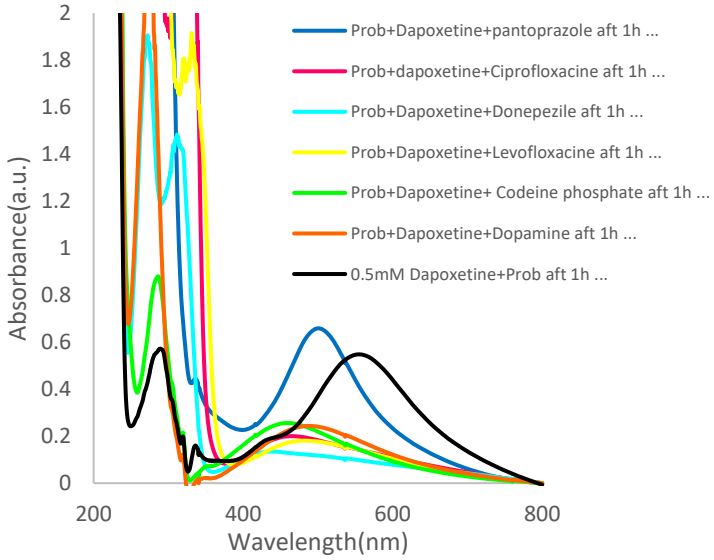
H

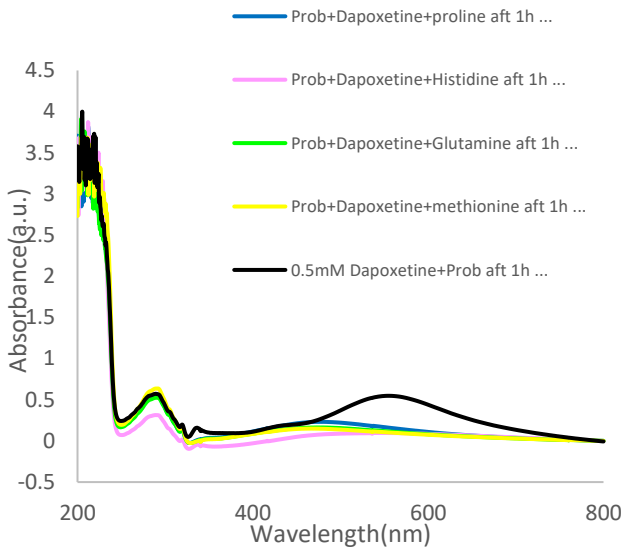



I
60min

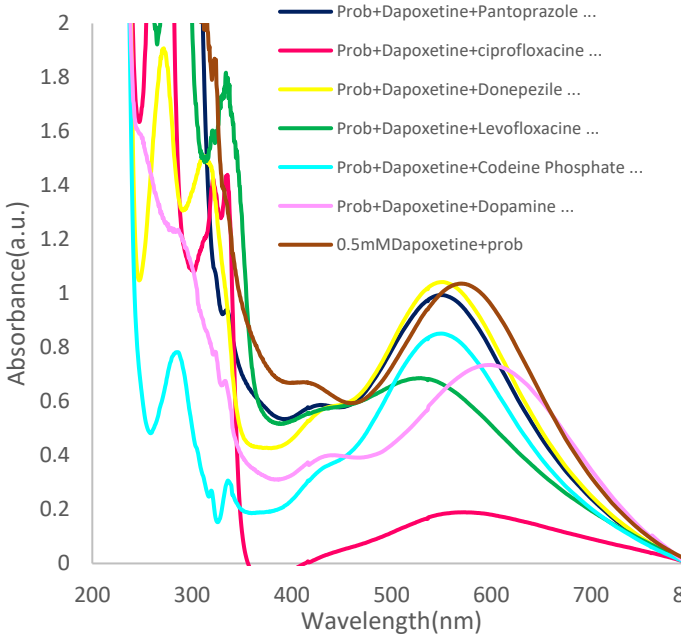

J
Absorbance(a.u.)
3
2.5
2
1.5
1
0.5
0
-0.5
200
300
400
500
600
700
800
Wavelength (nm)
Dapoxetine+prob+K+ aft 1h ...
Dapoxetine+prob+Na+ aft 1h ...
Dapoxetine+prob+Ca2+ aft 1h ...
Dapoxetine+prob+Zn2+ aft 1h ...
Dapoxetine+prob+Glycine aft 1h ...
Dapoxetine+prob+Alanine aft 1h ...
Dapoxetine+prob+Arginine aft 1h ...
Dapoxetine+prob+Tyrosine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...

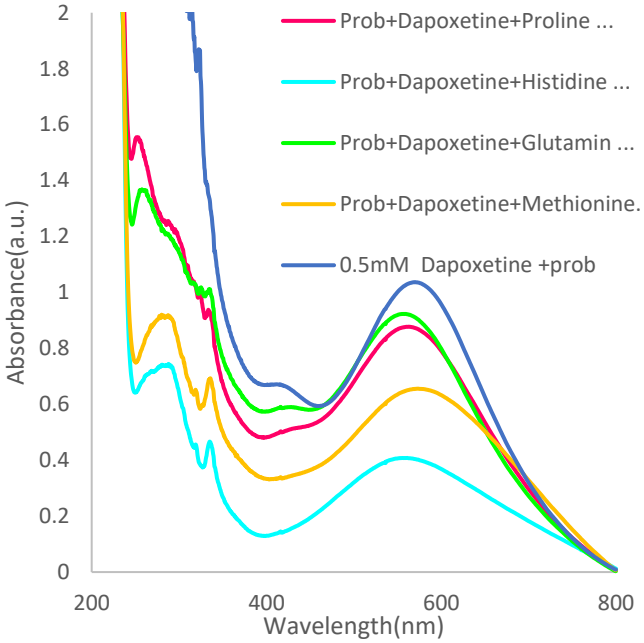
K


Absorbance(a.u.)
Wavelength(nm)
Prob+Dapoxetine+pantoprazole aft 1h ...
Prob+dapoxetine+Ciprofloxacine aft 1h ...
Prob+Dapoxetine+Donepezile aft 1h ...
Prob+Dapoxetine+Levofloxacine aft 1h ...
Prob+Dapoxetine+ Codeine phosphate aft 1h ...
Prob+Dapoxetine+Dopamine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...

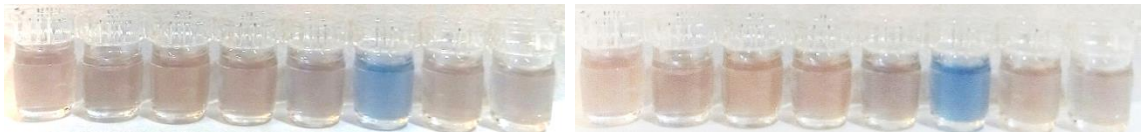

Absorbance(a.u.)
Wavelength(nm)
Prob+Dapoxetine+proline aft 1h ...
Prob+Dapoxetine+Histidine aft 1h ...
Prob+Dapoxetine+Glutamine aft 1h ...
Prob+Dapoxetine+methionine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...

L


Absorbance(a.u.)
Wavelength(nm)
Prob+Dapoxetine+Pantoprazole ...
Prob+Dapoxetine+ciprofloxacine ...
Prob+Dapoxetine+Donepezile ...
Prob+Dapoxetine+Levofloxacine ...
Prob+Dapoxetine+Codeine Phosphate ...
Prob+Dapoxetine+Dopamine ...
0.5mMDapoxetine+prob

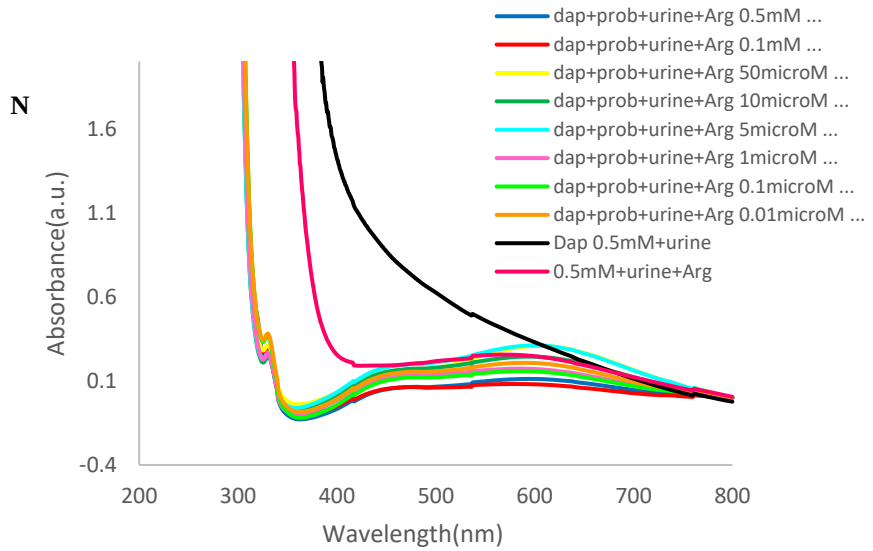

Absorbance(a.u.)
Wavelength(nm)
Prob+Dapoxetine+Proline ...
Prob+Dapoxetine+Histidine ...
Prob+Dapoxetine+Glutamin ...
Prob+Dapoxetine+Methionine.
0.5mM Dapoxetine +prob

M



0min **60min**

N



O

0min **60min**

P

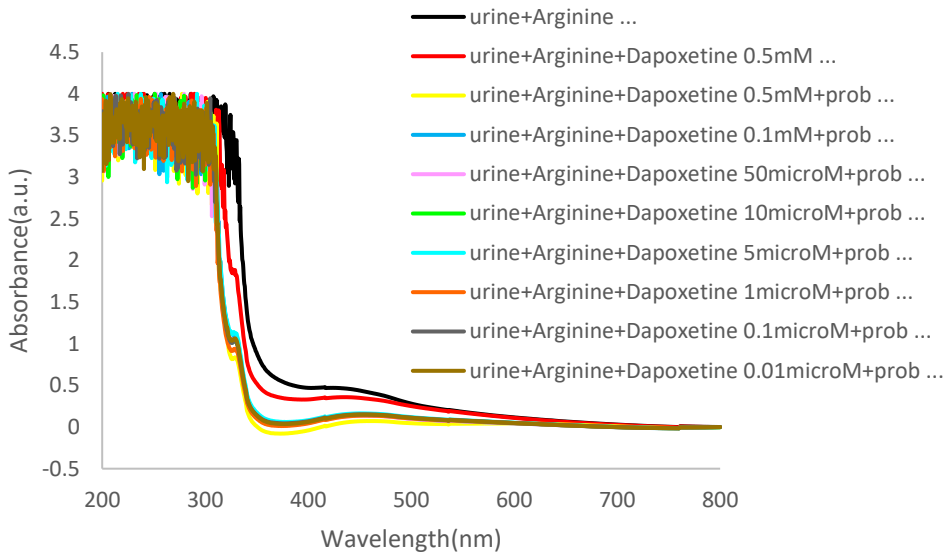
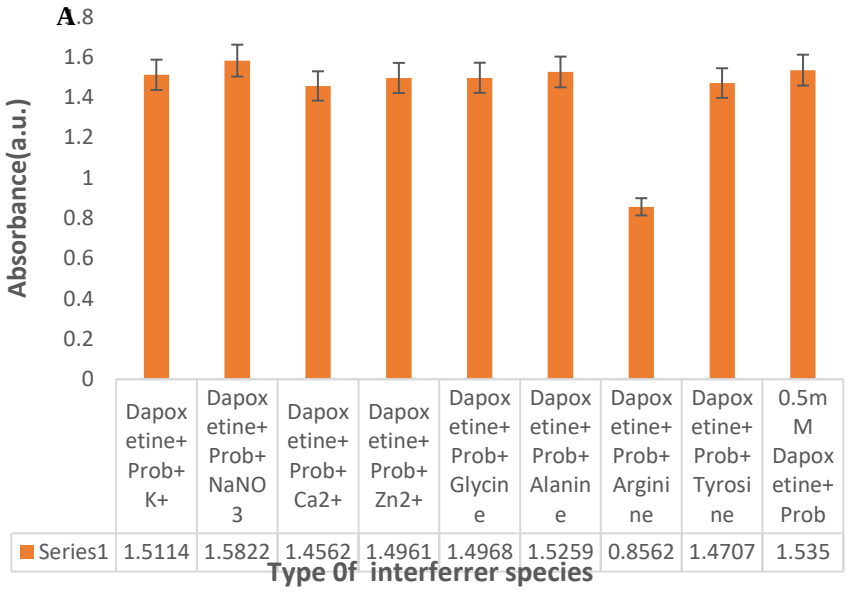
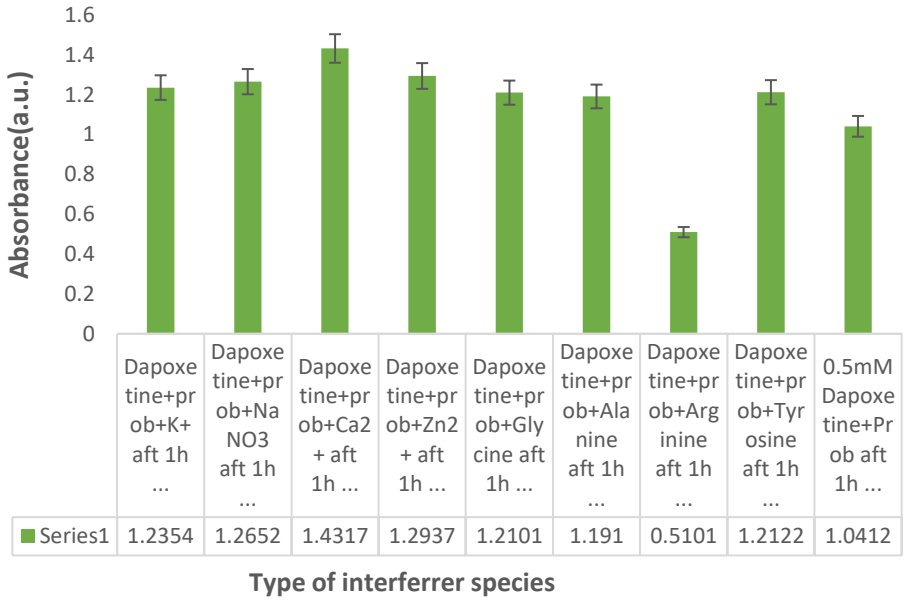


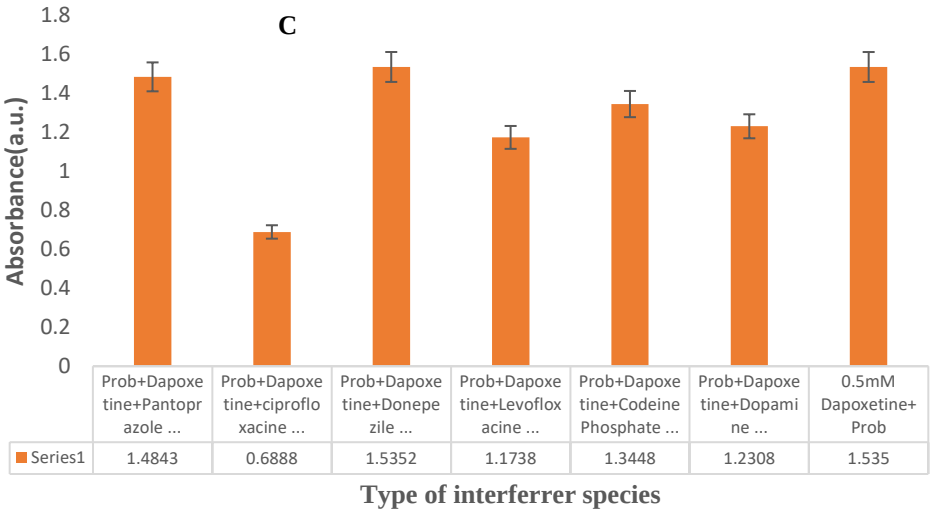
Fig. S4. (A), Photographic images (DPX +ions,AA) in 0min (1 : 1 v/v ratio),**(B),** UV-Vis spectra, DPX+ ions,AA, in 0min (1 : 1 v/v ratio) , **(C),** Photographic images (DPX +prob+ions,AA) in 0min (1:0.5:0.5 v/v ratio),**(D),** UV-Vis spectra, DPX+ ions,AA, in 0min (1:0.5:0.5 v/v ratio) **(E),** Photographic images (DPX +prob+AA) in0,60min(1:0.5:0.5 v/v ratio),**(F),** UV-Vis spectra, DPX+ ions,AA, in0,60min (1:0.5:0.5 v/v ratio) **(G),** Photographic images (DPX +prob+ions,AA) in 0min(1:0.5:0.5 v/v ratio) **(H),** UV-Vis spectra, DPX+ ions,AA, in 0min (1:0.5:0.5 v/v ratio), **(I),** Photographic images (DPX +prob+ions,AA) in 60min(1:0.5:0.5 v/v ratio), **(J),** UV-Vis spectra, DPX+ ions,AA, in 60min (1:0.5:0.5 v/v ratio), **(K),** UV-Vis spectra, DPX+ drugs,AA, in0 min (1:0.5:0.5 v/v ratio), **(L)** UV-Vis spectra, DPX+ drugs,AA, in60min (1:0.5:0.5 v/v ratio), **(M)** Photographic images (DPX +probe+urine+ different concentration of AA Argenine) in 0,60min(1:0.5:0.5 v/v ratio) **(N),** UV-Vis spectra, (DPX +probe+urine+ different concentration of AA Argenine), (1:0.5:0.5 v/v ratio),**(O)** Photographic images (different concentration of DPX +urine+AA Argenine, (1:0.5:0.5 v/v ratio) in 0,60min(1:0.5:0.5 v/v ratio), **(P),** UV-Vis spectra, (different concentration of DPX +urine+AA Argenine, (1:0.5:0.5 v/v ratio).

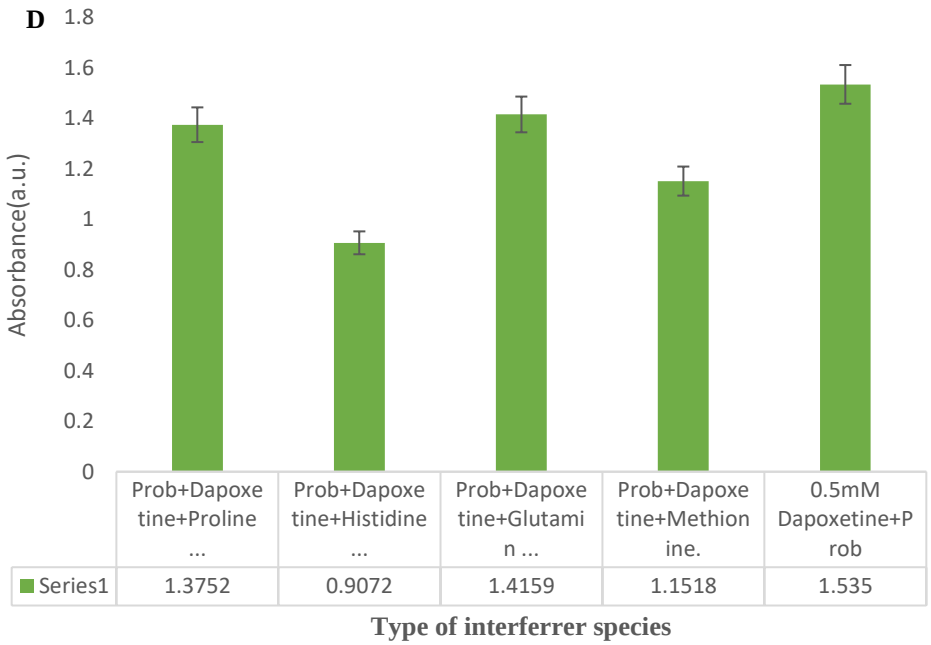
A

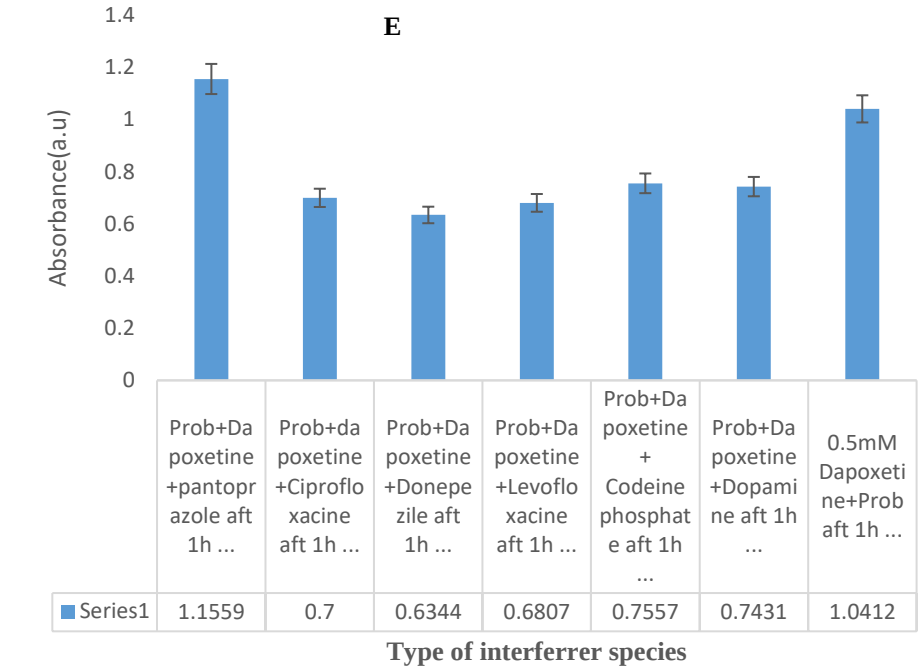

Absorbance(a.u.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Dapoxetine+Prob+K+
Dapoxetine+Prob+NaNO3
Dapoxetine+Prob+Ca2+
Dapoxetine+Prob+Zn2+
Dapoxetine+Prob+Glycine
Dapoxetine+Prob+Alanine
Dapoxetine+Prob+Arginine
Dapoxetine+Prob+Tyrosine
0.5mM Dapoxetine+Prob
Series1
1.5114
1.5822
1.4562
1.4961
1.4968
1.5259
0.8562
1.4707
1.535
Type 0f interferrer species

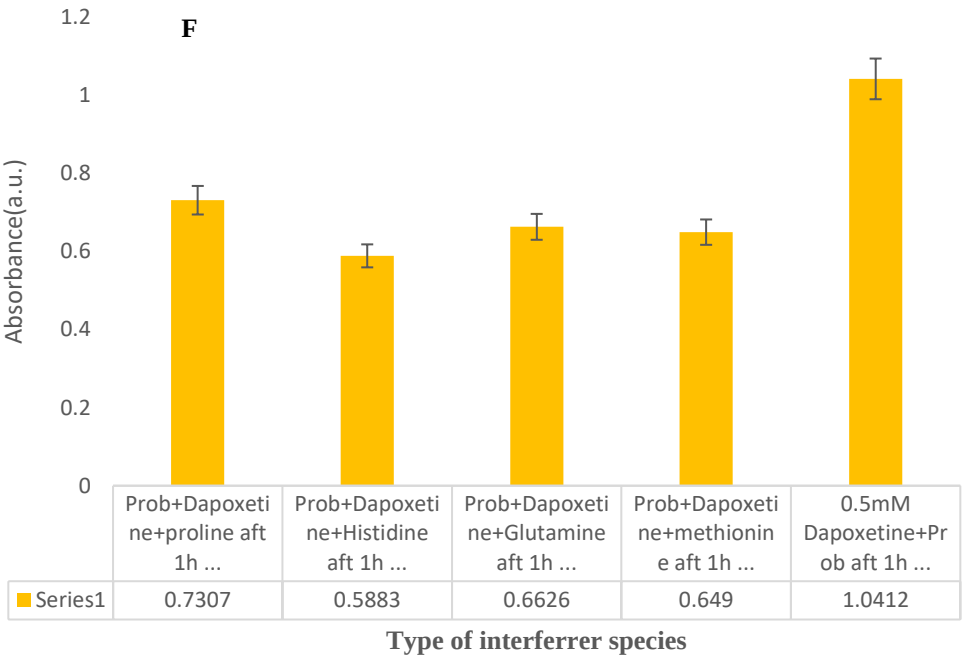
B

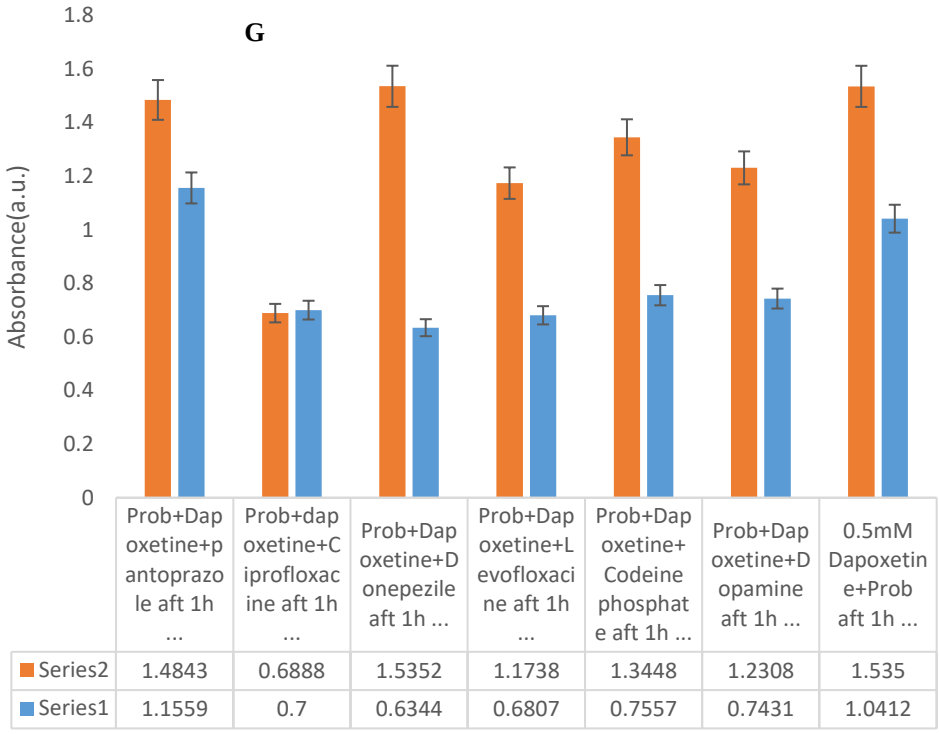

Absorbance(a.u.)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Dapoxetine+prob+K+ aft 1h ...
Dapoxetine+prob+NaNO3 aft 1h ...
Dapoxetine+prob+Ca2+ aft 1h ...
Dapoxetine+prob+Zn2+ aft 1h ...
Dapoxetine+prob+Glycine aft 1h ...
Dapoxetine+prob+Alanine aft 1h ...
Dapoxetine+prob+Arginine aft 1h ...
Dapoxetine+prob+Tyrosine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...
Series1
1.2354
1.2652
1.4317
1.2937
1.2101
1.191
0.5101
1.2122
1.0412
Type of interferrer species

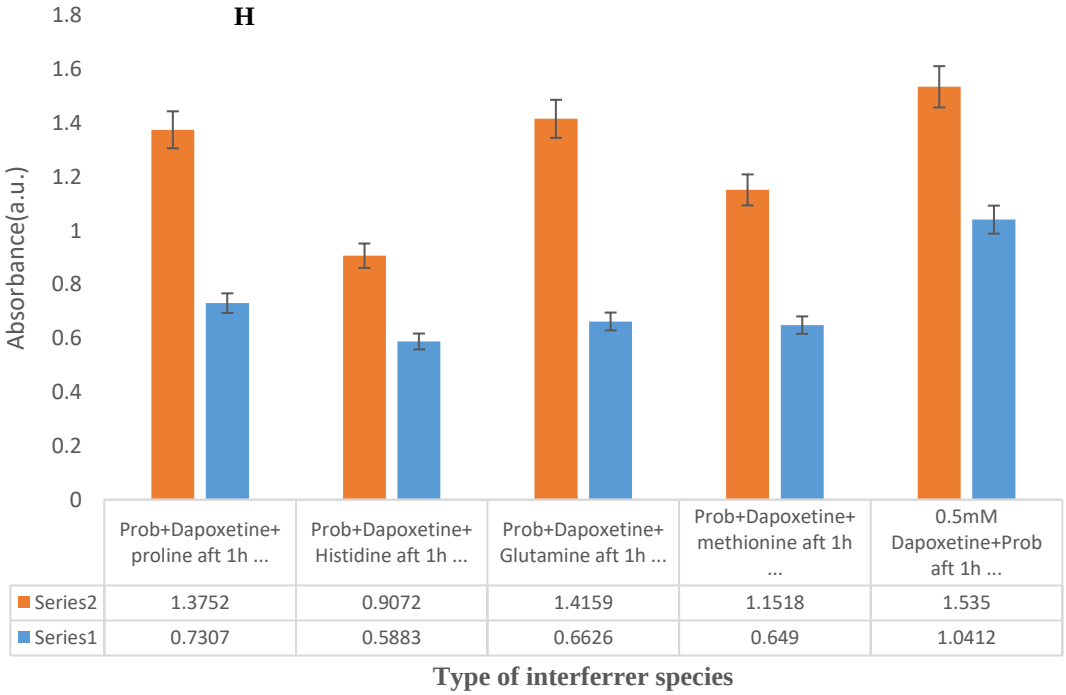

C
Absorbance(a.u.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine+Pantoprazole ...
Prob+Dapoxetine+ciprofloxacine ...
Prob+Dapoxetine+Donepezile ...
Prob+Dapoxetine+Levofloxacine ...
Prob+Dapoxetine+Codeine Phosphate ...
Prob+Dapoxetine+Dopamine ...
0.5mM Dapoxetine+Prob
Series1
1.4843
0.6888
1.5352
1.1738
1.3448
1.2308
1.535
Type of interferrer species


D
Absorbance(a.u.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine+Proline ...
Prob+Dapoxetine+Histidine ...
Prob+Dapoxetine+Glutamin ...
Prob+Dapoxetine+Methionine.
0.5mM Dapoxetine+Prob
Series1
1.3752
0.9072
1.4159
1.1518
1.535
Type of interferrer species


E
Absorbance(a.u)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine +pantoprazole aft 1h ...
Prob+dapoxetine +Ciproflo xacine aft 1h ...
Prob+Dapoxetine +Donepezile aft 1h ...
Prob+Dapoxetine +Levoflo xacine aft 1h ...
Prob+Dapoxetine + Codeine phosphate aft 1h ...
Prob+Dapoxetine +Dopamine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...
Series1
1.1559
0.7
0.6344
0.6807
0.7557
0.7431
1.0412
Type of interferrer species


F
Absorbance(a.u.)
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine+proline aft 1h ...
Prob+Dapoxetine+Histidine aft 1h ...
Prob+Dapoxetine+Glutamine aft 1h ...
Prob+Dapoxetine+methionine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...
Series1
0.7307
0.5883
0.6626
0.649
1.0412
Type of interferrer species


G
Absorbance(a.u.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine+pantoprazole aft 1h ...
Prob+dapoxetine+Ciprofloxacine aft 1h ...
Prob+Dapoxetine+Donepezile aft 1h ...
Prob+Dapoxetine+Levofloxacine aft 1h ...
Prob+Dapoxetine+ Codeine phosphate aft 1h ...
Prob+Dapoxetine+Dopamine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...
Series2 1.4843 0.6888 1.5352 1.1738 1.3448 1.2308 1.535
Series1 1.1559 0.7 0.6344 0.6807 0.7557 0.7431 1.0412
Type of interferrer species


H
Absorbance(a.u.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Prob+Dapoxetine+ proline aft 1h ...
Prob+Dapoxetine+ Histidine aft 1h ...
Prob+Dapoxetine+ Glutamine aft 1h ...
Prob+Dapoxetine+ methionine aft 1h ...
0.5mM Dapoxetine+Prob aft 1h ...
Series2 1.3752 0.9072 1.4159 1.1518 1.535
Series1 0.7307 0.5883 0.6626 0.649 1.0412
Type of interferrer species

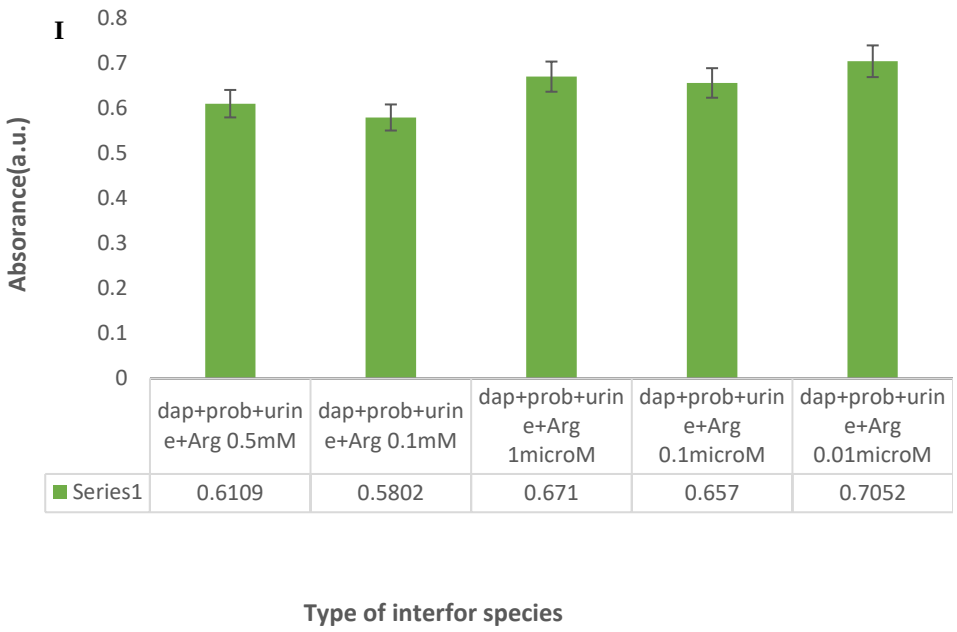
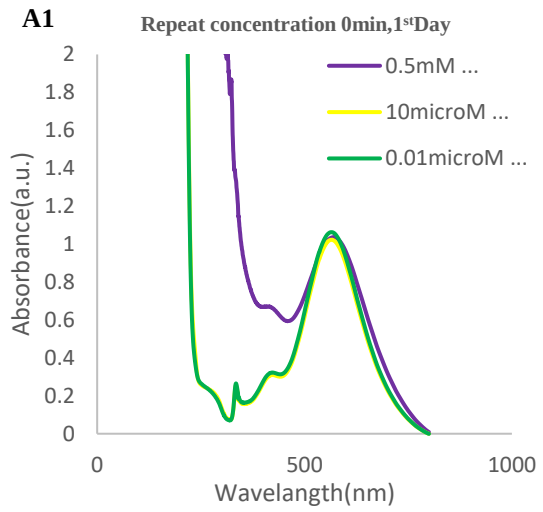
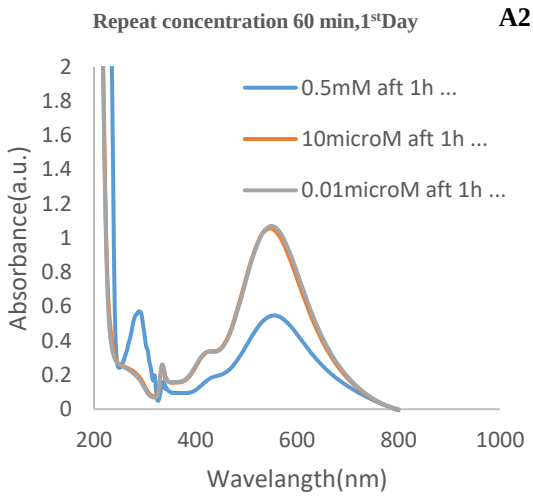


Fig. S5. A. The histogram curve of peak intensity versus prob +drug vs interference in 0 min (1:0.5:0.5 v/v ratio), **B**. the histogram curve of peak intensity versus prob+drug vs interference in 60 min (1:0.5:0.5 v/v ratio), **C.** The histogram curve of peak intensity versus prob+DPX+drug in 0min (1:0.5:0.5 v/v ratio), **D.** The histogram curve of peak intensity versus prob+DPX +Amino acids in 0min (1:0.5:0.5 v/v ratio), **E.** The histogram curve of peak intensity versus prob+DPX+drug in 60min (1:0.5:0.5 v/v ratio), **F.** The histogram curve of peak intensity versus prob+DPX+drug in 60min (1:0.5:0.5 v/v ratio), **G.**Total calibration prob+DPX+drug in (0,60min) (1:0.5:0.5 v/v ratio), H**.** Total calibration prob+DPX+Amino acids (1:0.5:0.5 v/v ratio) in (0,60min), **I.** The histogram curve of peak intensity versus prob+DPX+different concentration of Arginine interference (1:0.5:0.5 v/v ratio)

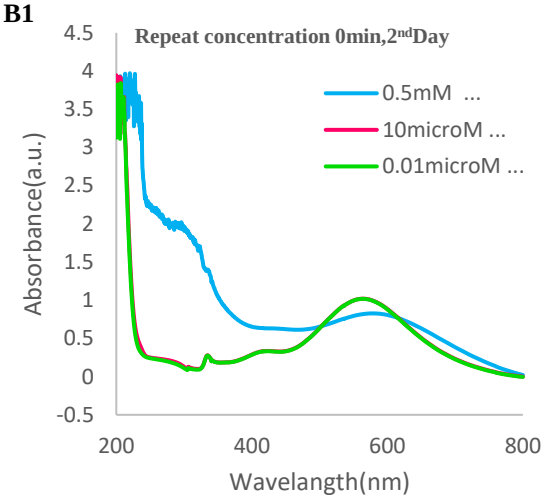
A1



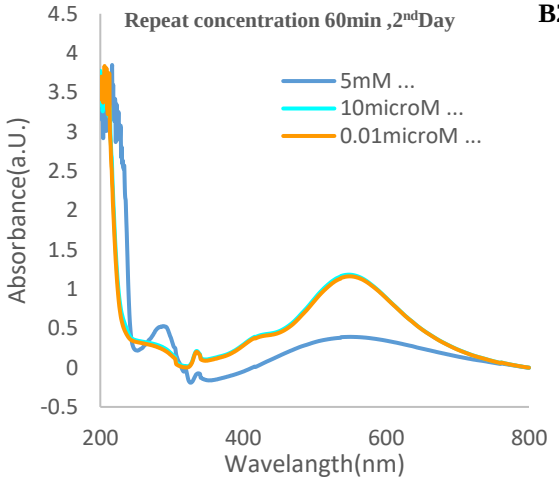
A2



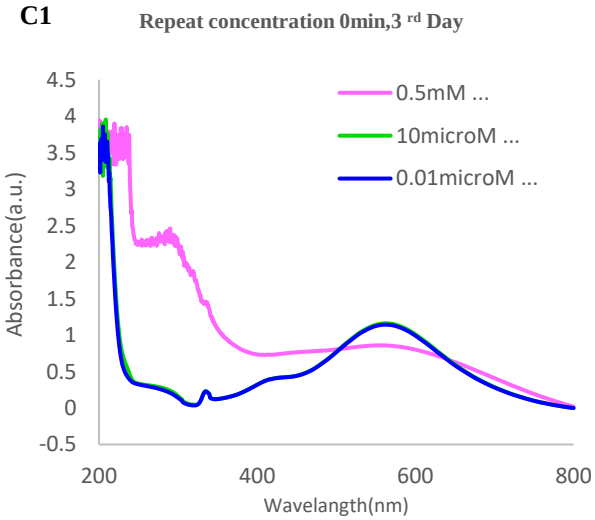
B1



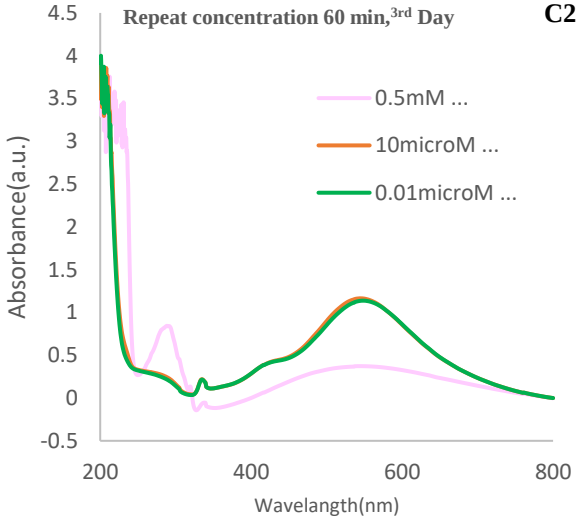
B2



C1



C2



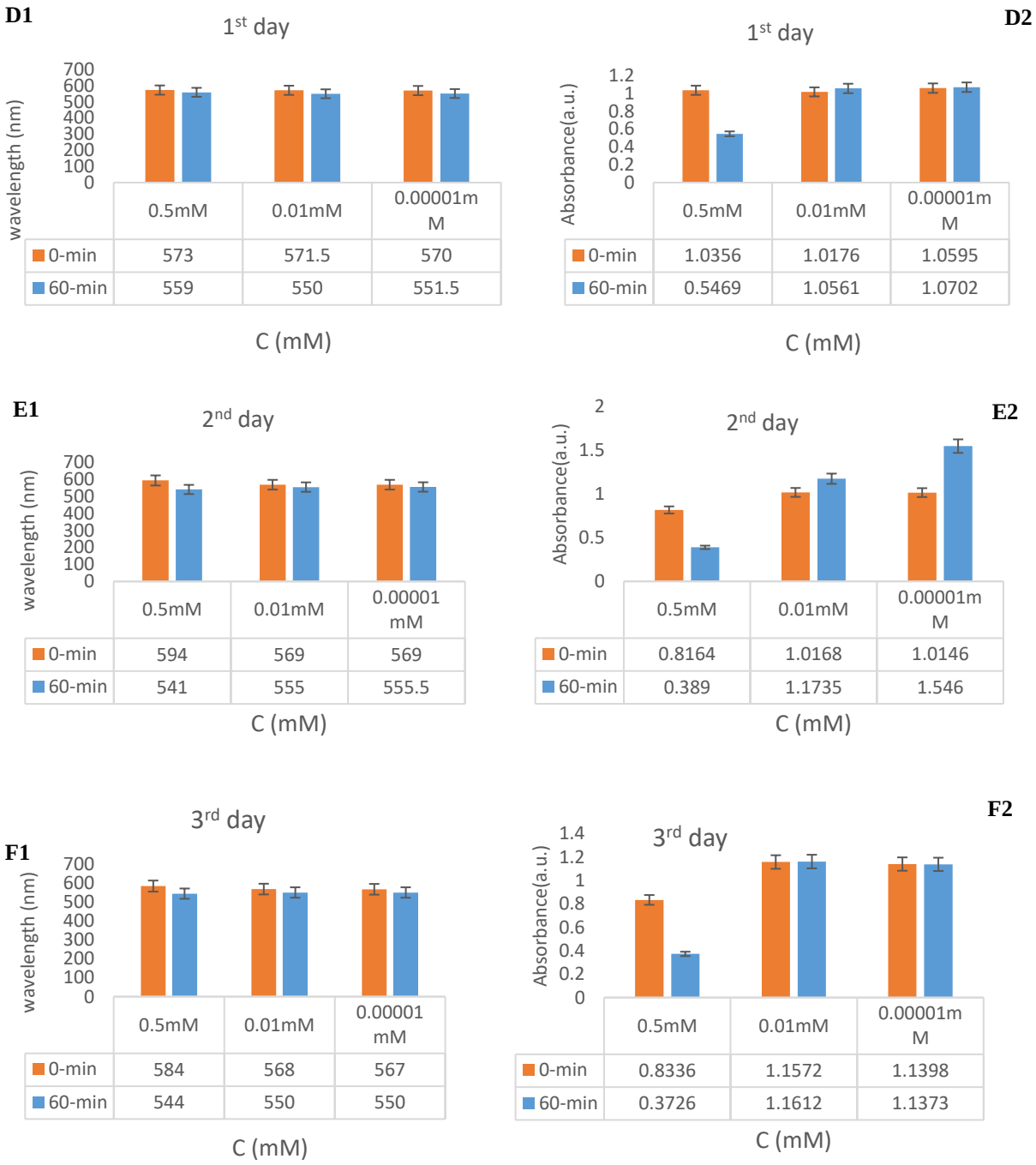


Fig. S6. UV-Vis spectral stability of DPX solution over a span of 3 days with different concentrations and at both the 0-minute and 60-minute marks, and the results of the histogram of DPX solution for 3 days with 3 different concentrations and at both the 0-minute and 60-minute marks**. A1**.UV-Vis spectra of DPX solution in 1 day at 0-min, **A2**. UV-Vis spectra of DPX solution in 1 day in 60-min, **B1**. UV-Vis spectra of DPX solution in 2 day with no initial incubation time, **B2**. UV-Vis spectra of DPX solution in 2 day with incubation time of 60 min, **C1**. UV-Vis spectra of DPX solution in 3 days with no initial incubation time**, C2**. UV-Vis spectra of DPX solution in 3 days with incubation time of 60-min**, D1.** The histogram curve of wavelength intensity versus of DPX solution in 1 day in incubation time of 0-min and 60-min (1:0.5:0.5 v/v ratio)**, D2.** The histogram curve of peak intensity versus of DPX solution in incubation time of 1 day in

0, 60min (1:0.5:0.5 v/v ratio), **E1.** The histogram curve of wavelength intensity *versus* of DPX solution in 2 days in incubation time of 0-min and 60-min (1:0.5:0.5 v/v ratio)**, E2.** The histogram curve of peak intensity versus of DPX solution in 2 days in incubation time of 0-min and 60-min (1:0.5:0.5 v/v ratio), **F1.** The histogram curve of wavelength intensity versus of DPX solution in 2 days in incubation time of 0-min and 60-min (1:0.5:0.5 v/v ratio)**, F2.** The histogram curve of peak intensity versus of DPX solution in 2 days in incubation time of 0-min and 60-min (1:0.5:0.5 v/v ratio).

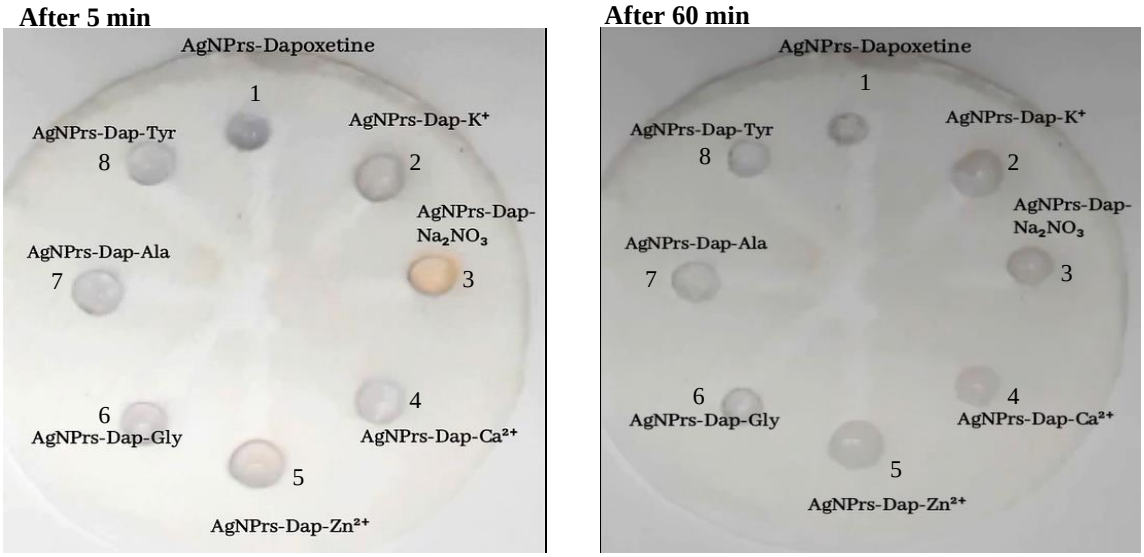


Fig.S7. Photographic images of the fiberglass microfluidic paper-based colorimetric chemosensor after 5 and 60 minutes.(1) DPX +AgNPrs, (2).DPX +AgNPrs+K^+ (3). DPX +AgNPrs+Na^+, (4). DPX +AgNPrs+Ca^{2+}, (5). DPX+AgNPrs+Zn^{2+}, (6).DPX+AgNPrs+Glycine, (7).DPX+AgNPrs+Alanine, 8.DPX+AgNPrs+Tyrosine.

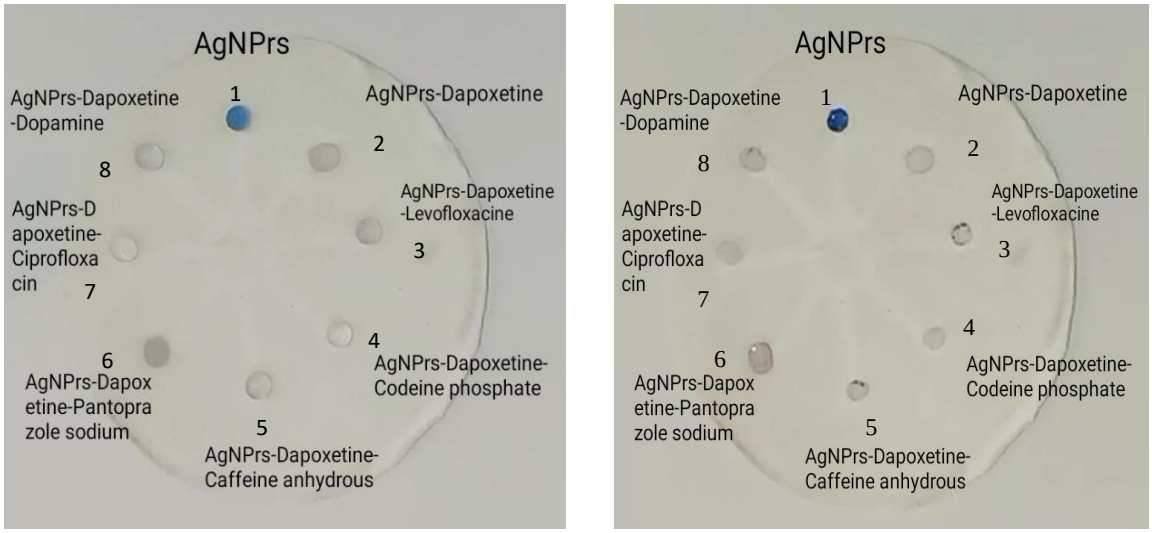


Fig. S8. Photographic images of the fiberglass microfluidic paper-based colorimetric chemosensor after 5 and 60 minutes. (1).AgNPrs, (2). DPX+AgNPrs, (3). DPX+AgNPrs+Levofloxacine, (4). DPX+AgNPrs+Codeine phosphate, (5). DPX+ AgNPrs+Caffeine anhydrous, (6). DPX+AgNPrs+Pantoprazole sodiume, (7). DPX+AgNPrs+Ciprofloxacine, (8). DPX+ AgNPrs+Dopamine.

Scheme S1. Materials and equipment (I), and the process (II) of µPAD fabrication. Wax malting at 90 degrees Celsius, followed by filter paper, put it flat. (A), and left it for 2 s (B), afterwards, the filter paper was taken out (C) to prepare a paraffinic paper (D). The locally machined steel stamp was heated at 150 ºC for 25º and the p-paper was put on the n-paper (E), before stamping (F). The stamping step was performed during 8 s (G) to prepare the proposed μPAD.

Table S1. UV-Vis Spectra Data for Different Concentrations and Time Intervals

Concentration (mM) / Wavelength (nm)	0.5 mM	0.01 mM	0.00001 mM
1st day 0-min	573	571.5	570
2nd day 0-min	594	569	569
3rd day 0-min	584	568	567
SD	10.50	1.80	1.52
1st day 60-min	559	550	551.5
2nd day 60-min	541	555	555.5
3rd day 60-min	544	550	550
SD	9.64	2.88	2.84