Supporting information

Microreactor assembled on parafilm towards opto-analysis of Cu(II), Cr(VI), and Ni(II) ions in fish samples by specific indicators

Farnaz Bahavarnia [a], Houman Kholafazad Kordasht [b], Mohammad Hasanzadeh [c,*], Nasrin Shadjou [d]

[a] Asian Nano-Ink Co., Tabriz University of Medical Sciences, Tabriz, Iran.

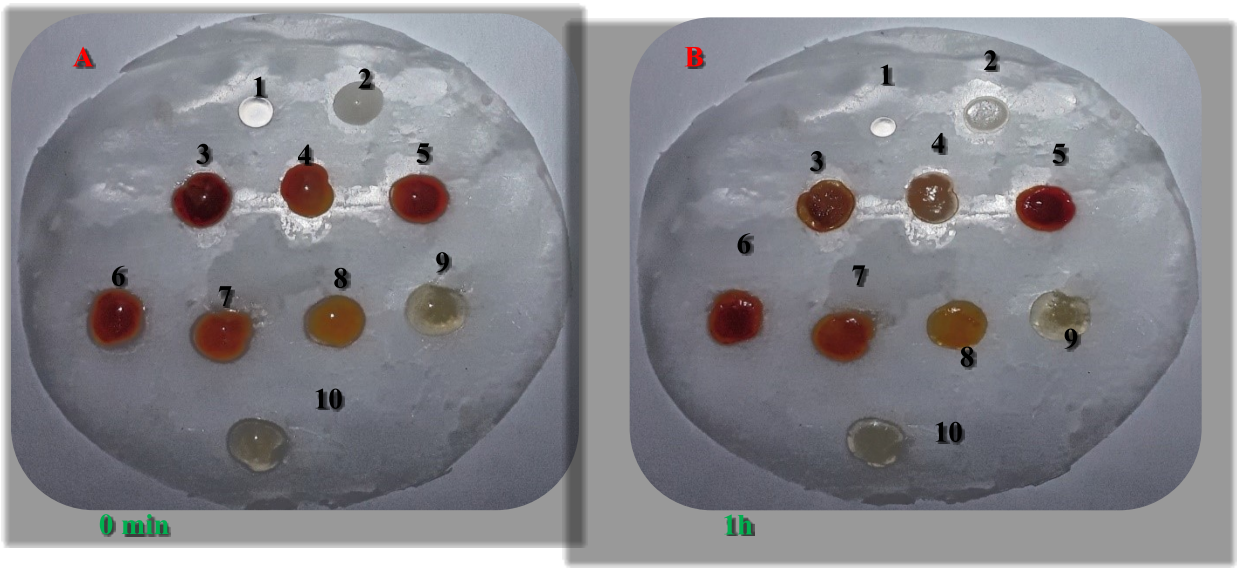
[b] Pharmaceutical Analysis Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

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

[d] Department of Nanotechnology, Faculty of Chemistry, Urmia University, Urmia, 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. Photographs of modified PCMA with **(1)** fish meat, **(2)** H_2O, **(3)** HA/Neocuproine/Cu(II), **(4)** diphenyl carbazide/H_2SO_4/Cr(VI), **(5)** dimethylglyoxime/Ethanol/NaF/$Na_2S_2O_3$/Ni(II).



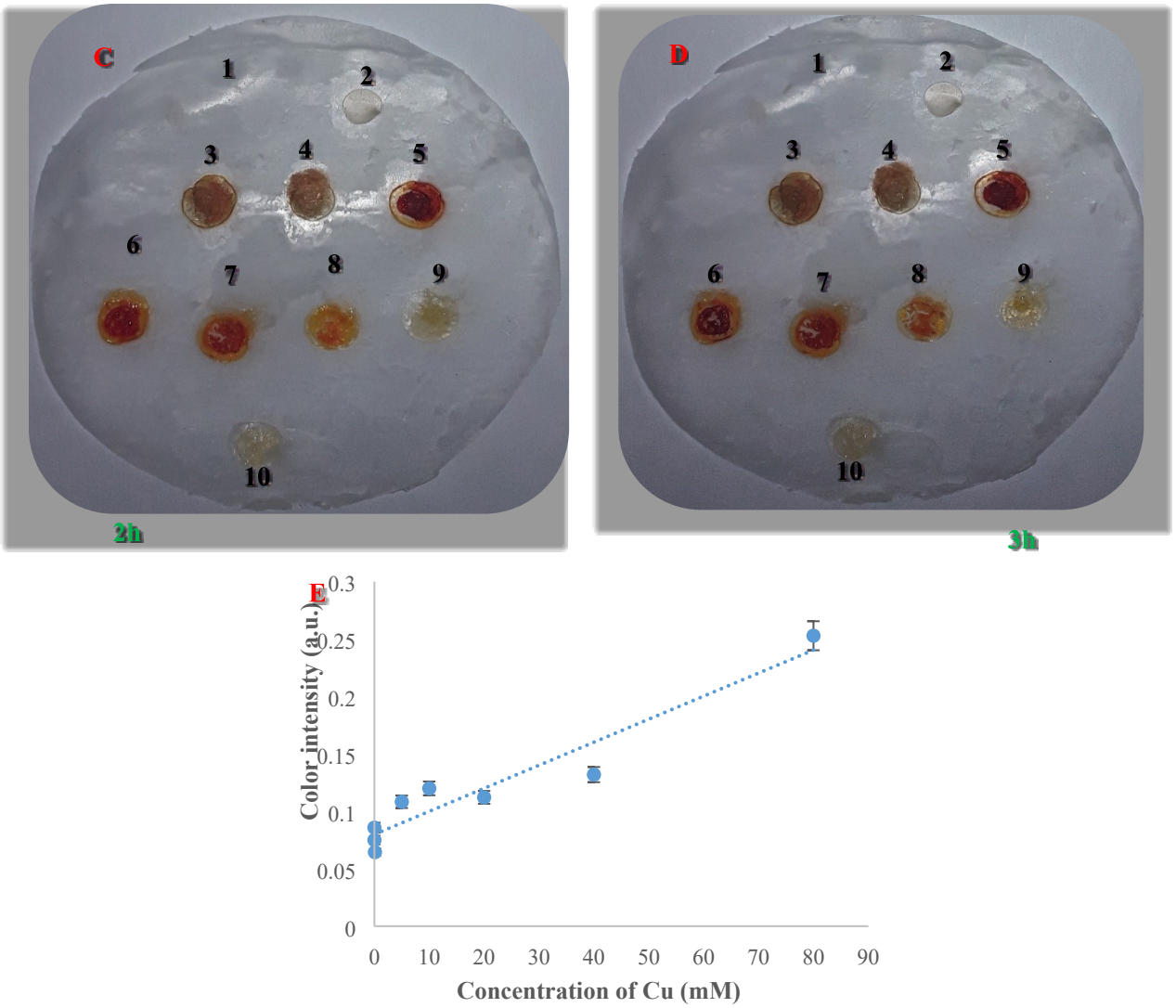
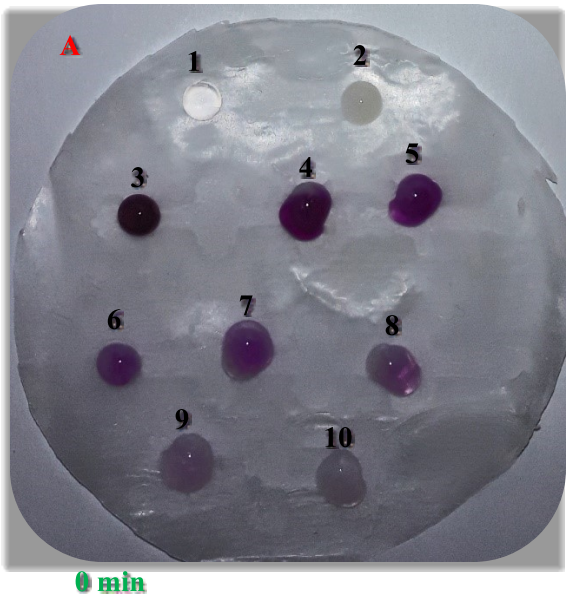
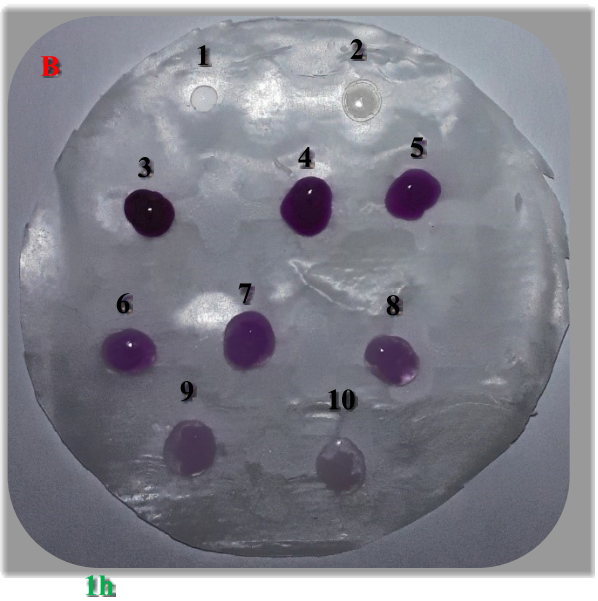
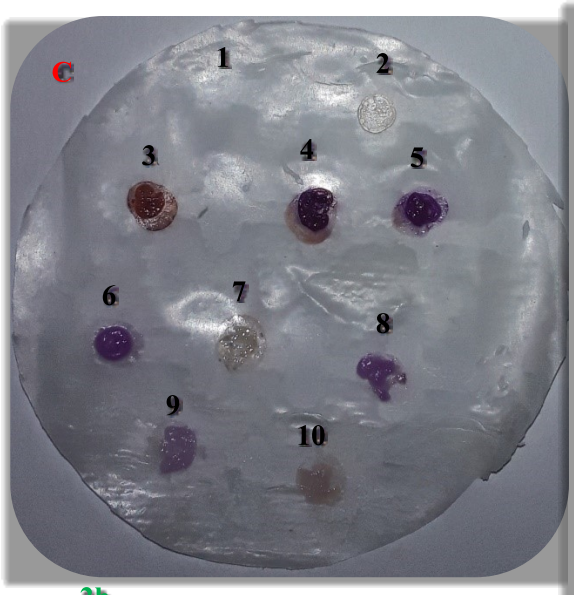
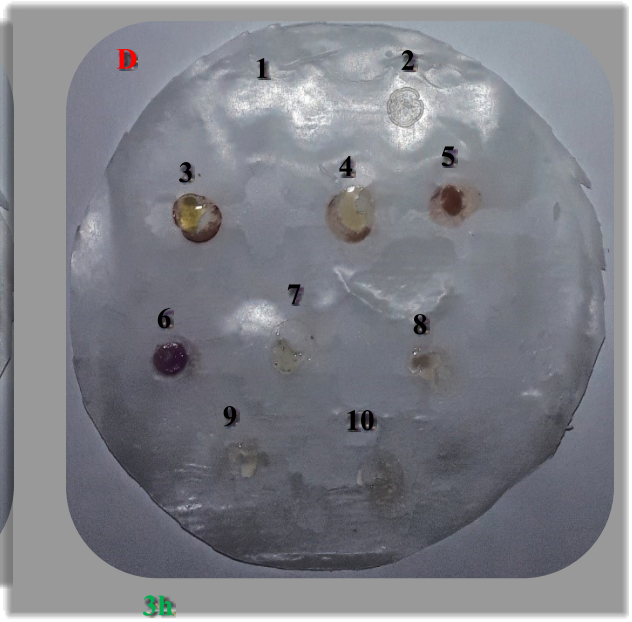


Fig. S2. (A-D). Photographs of the modified PCMA at four incubation times, including 0, 60, 120, and 180 minutes, with **(1)** H_2O, **(2)** fish meat, and (**3–10**) fish meat/HA/Acetic acid buffer/Neocuproine/Chloroform/Cu(II) at concentrations of 0.005, 0.01, 0.1, 5, 10, 20, 40, and 80 mM. **(E)** Calibration curves (n=3, SD=2.046±0.2).


A
1
2
3
4
5
6
7
8
9
10
0 min


B
1
2
3
4
5
6
7
8
9
10
1h


C
1
2
3
4
5
6
7
8
9
10
2h


D
1
2
3
4
5
6
7
8
9
10
3h

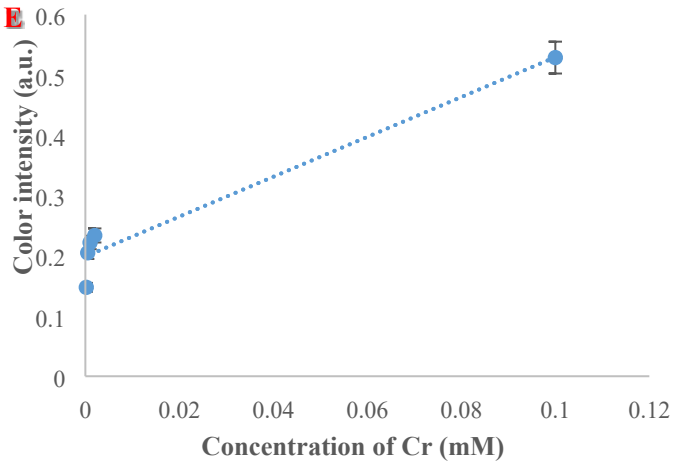


Fig. S3 (A-D). Photographs of the modified PCMA at four incubation times, including 0, 60, 120, and 180 minutes, with **(1)** H_2O, **(2)** fish meat, and **(3–10)** fish meat/Diphenyl carbazide/Acetone/H_2SO_4/Cr(VI) at concentrations of 0.0002, 0.0005, 0.001, 0.002, and 0.1 mM. **(E).** Calibration curves. (n=3, SD=2.063±0.2).

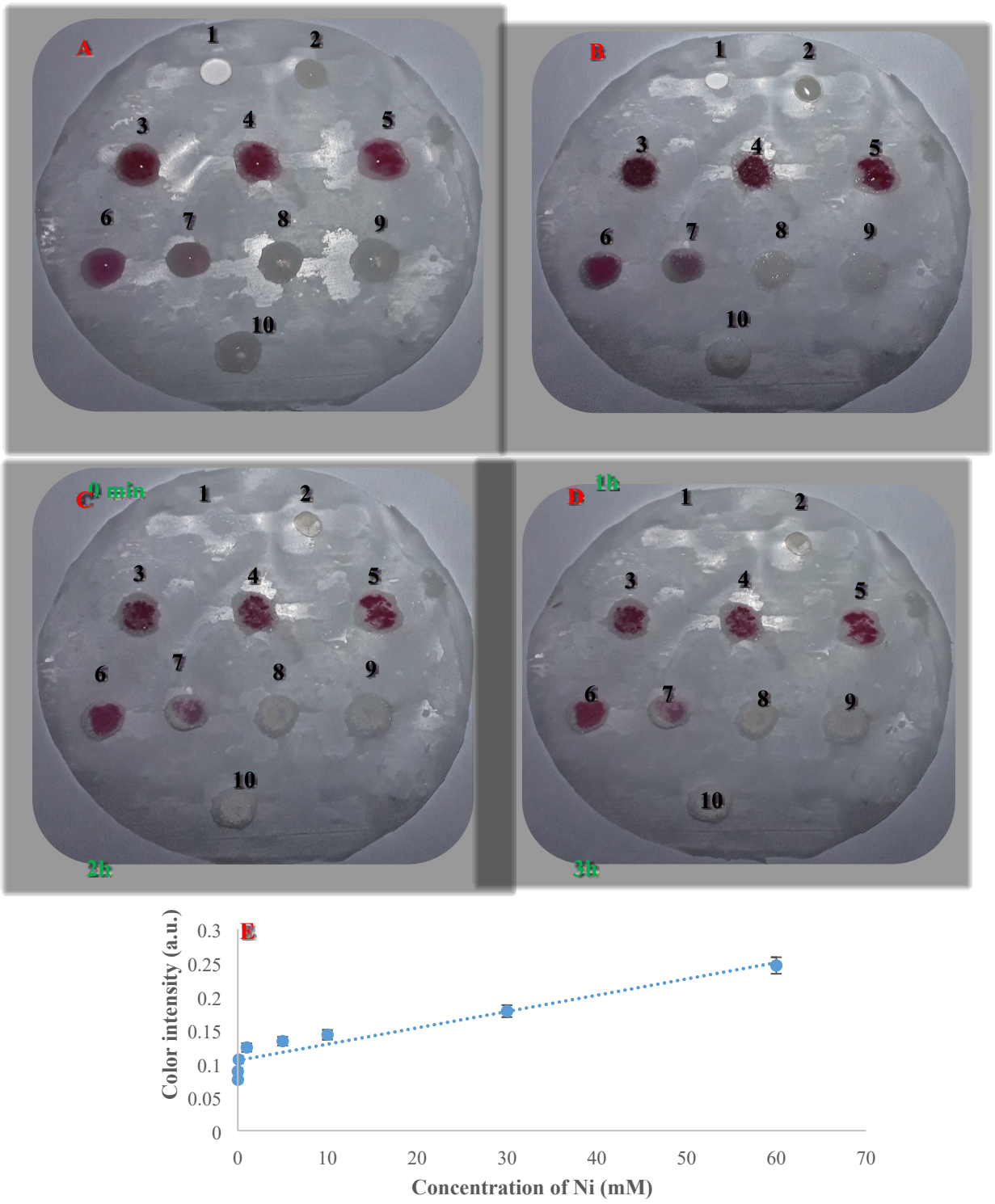


Fig. S4. (A-D). Photographs of the modified PCMA at four incubation times, including 0, 60, 120, and 180 minutes, with **(1)** H_2O, **(2)** fish meat, and **(3–10)** fish meat/Dimethylglyoxime/Ethanol/NaF/$Na_2S_2O_3$/Ni(II) at concentrations of 0.002 0.01, 0.1, 1, 5, 15, and 30 mM. (**E**) Calibration curves. (n=3, SD=1.79±0.2).

Table S1. Analytical summary of colorimetric data and detection sensitivity our study for detecting candidate metal ions.

Fig	Item	RGB code	~ Color name	Barcode	ʎ (nm)	LLOQ
5 A	1	229,245,247	Cool Minit	#E5F5F7	547	5 µM
	2	230,187,66	Meat Brown	#E6BB42	588	
	3	214,187,66	Old Gold	#D6BB42	591	
	4	225,161,62	Mari Gold	#E1A13E	592	
	5	234,178,61	Xanthous	#EAB23D	594	
	6	191,123,22	Mustard Brown	#BF7B16	594	
	7	226,162,41	Mari Gold	#E2A229	592	
	8	199,199,174	Dark Beige	#CVCVAE	575	
	9	162,153,154	Spanish Gray	#A2999A	572	
5 B	1	182,187,190	Medium Gray	#B6BBBE	483	3nM
	2	31,12,21	Black Purple	#1F0C15	453	
	3	39,16,37	Dark Purple	#271025	453	
	4	29,0,30	Black Purple	#1D001E	453	
	5	62,23,76	Russian Violet	#3E174C	456	
	6	50,30,68	Russian Violet	#320344	458	
	7	77,45,94	Old Heliotrope	#4D2D5E	460	
	8	84,60,96	Old Heliotrope	#543C60	462	
	9	111,99,121	Old Lavender	#6F6379	462	
5 C	1	247,254,255	Neon Withe	#F7FEFF	481	0.1mM
	2	142,22,59	Cleart	#8E163B	466	
	3	156,41,88	Jazzberry Jam	#9C2958	463	
	4	155,66,122	Maximum Red purple	#9B427A	477	
	5	157,132,161	Glossy Grape	#9DA4A1	473	
	6	156,159,175	Manatee	#9C9FAF	456	
	7	172,181,192	Zinc	#ACB6C0	456	
	8	146,153,163	Gadet Gray	#9299A3	453	
	9	152,161,170	Gadet Gray	#98A1AA	453a	