

Supplementary Material

A simple 3D printed microfluidic device for point-of-care analysis of urinary uric acid

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Table S1. The experimental factors at five levels for central composite design optimization.

Variable (unit)	Abbreviation	Level				
		-2	-1	0	+1	+2
Reaction time (min)	Time	2.5	7	13.5	20	24.5
Concentration of 1,10-phenanthroline (mol L ⁻¹)	C (phen)	0.006	0.025	0.052	0.08	0.099
Concentration of Fe ⁺³ (mol L ⁻¹)	C (Fe ⁺³)	0.003	0.02	0.045	0.07	0.087

Table S2. Central composite design experimental matrix and the obtained responses (color intensity).

Run	Time	C (phen)	C (Fe ⁺³)	Intensity
1	13.50	0.052	0.045	72.35
2	7.00	0.025	0.07	35.11
3	13.50	0.052	0.003	25.52
4	2.57	0.052	0.045	31.66
5	13.50	0.006	0.045	44.03
6	7.00	0.080	0.02	54.56
7	7.00	0.025	0.02	21.92
8	7.00	0.080	0.07	59.11
9	13.50	0.052	0.045	71.82
10	20.00	0.025	0.02	25.30
11	13.50	0.052	0.045	71.46
12	24.43	0.052	0.045	30.17
13	13.50	0.052	0.045	71.81
14	20.00	0.080	0.07	53.06
15	20.00	0.025	0.07	50.12
16	13.50	0.052	0.045	71.48
17	13.50	0.099	0.045	74.83
18	13.50	0.052	0.045	71.39
19	20.00	0.080	0.020	33.99
20	13.50	0.052	0.087	53.43

Table S3. ANOVA results for the suggested CCD model.

Source	Sum of Squares	Df	Mean Square	F-value	p-value
Model	7074.81	9	786.09	648.92	0.000
A= Time	8.44	1	8.44	6.97	0.025
B= C phen	1055.63	1	1055.63	871.42	0.000
C=C Fe ⁺³	863.10	1	863.10	712.49	0.000
A ²	3157.90	1	3157.90	2606.84	0.000
B ²	3157.90	1	321.25	265.19	0.000
C ²	1998.65	1	1998.65	1649.88	0.000
A.B	253.24	1	253.24	209.05	0.000
A.C	85.48	1	85.48	70.56	0.000
B.C	25.88	1	25.88	21.37	0.001
Residual	12.11	10	1.21	- - -	- - -
Lack of Fit	4.73	5	0.95	0.64	0.682
Pure Error	7.39	5	1.48	- - -	- - -
Cor Total	7086.93	19	- - -	- - -	- - -

Fig. S1. The design that illustrates the whole set operating protocol of the POCT device for the smartphone-based colorimetric determination of urinary uric acid.

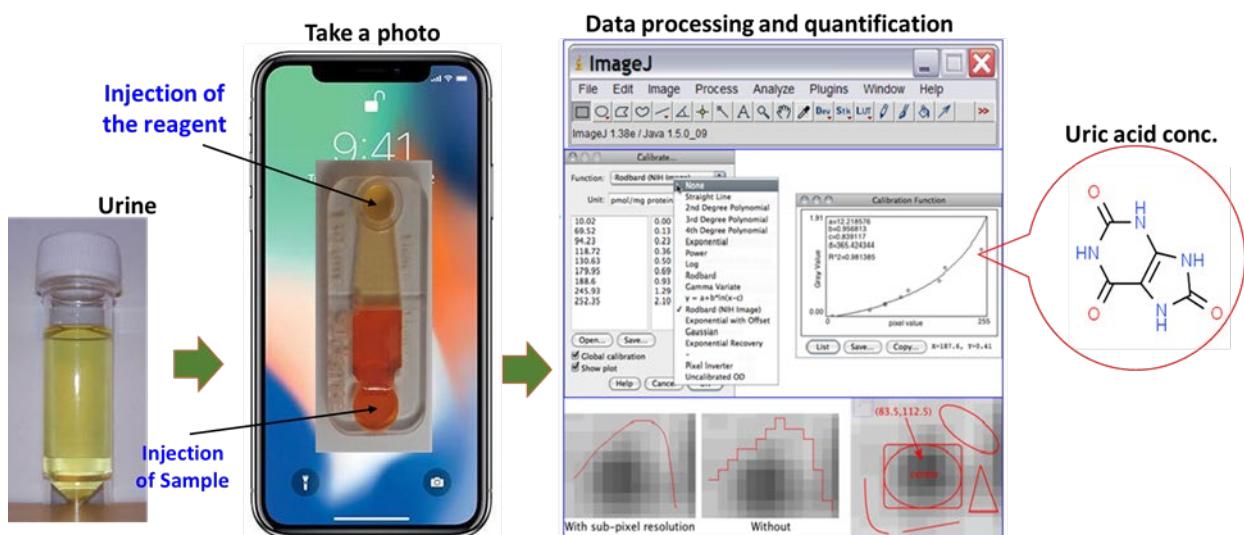


Fig. S2. The injection, color development, and data processing steps for the smartphone-based colorimetric determination of uric acid in urine.

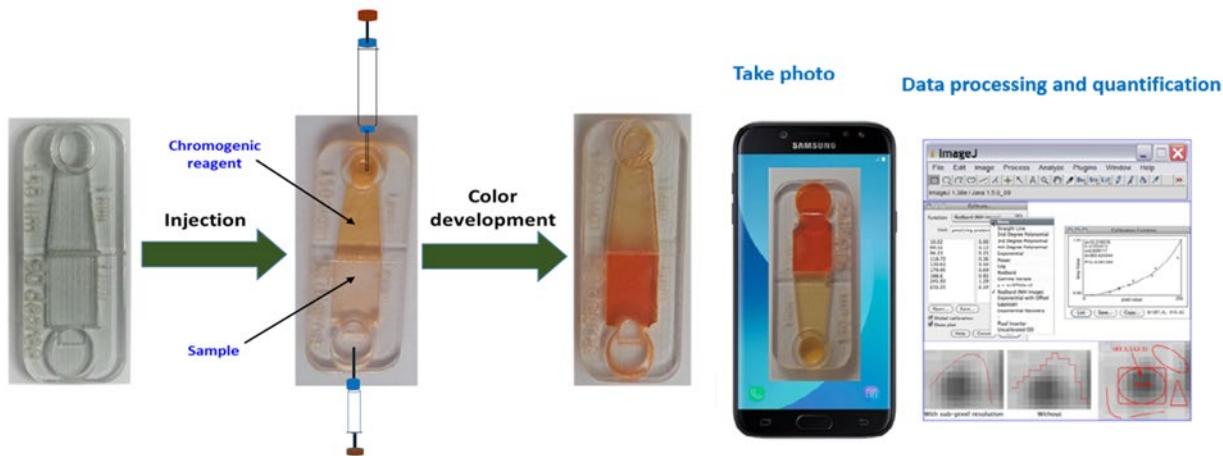


Fig. S3. Interaction diagram obtained from the central composite design for phenanthroline concentration, reaction time, and Fe^{+3} concentration.

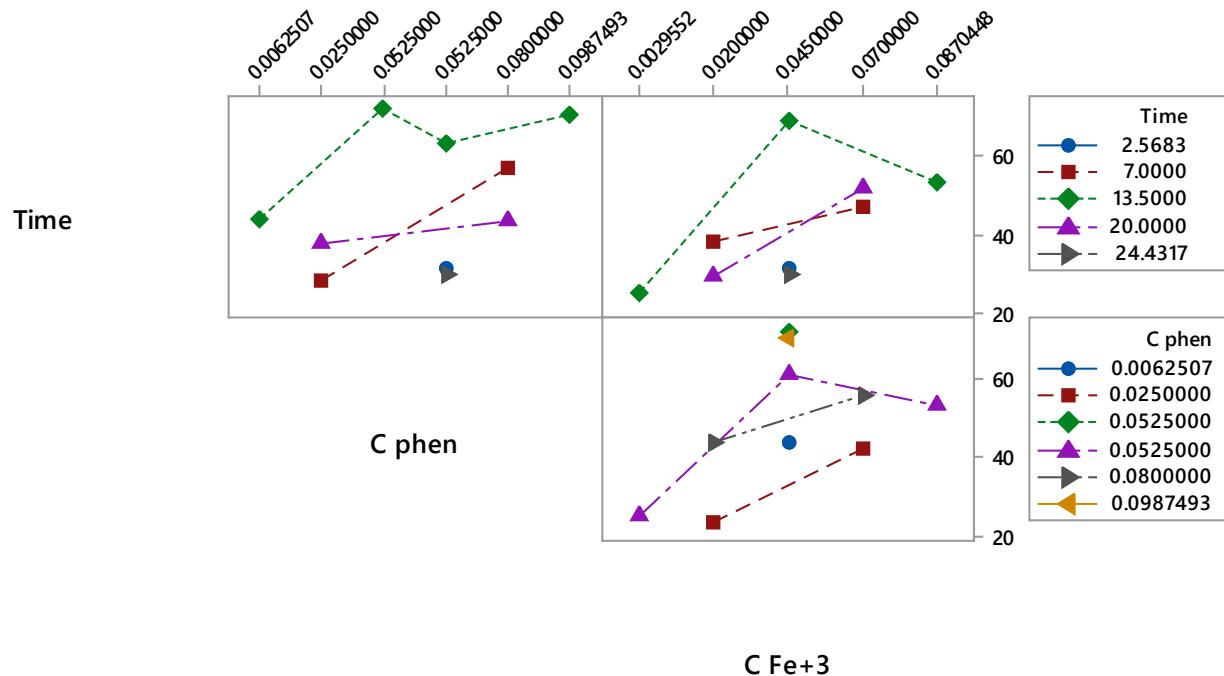


Fig. S4. The calibration graph for the smartphone-based colorimetric determination of urinary uric acid.

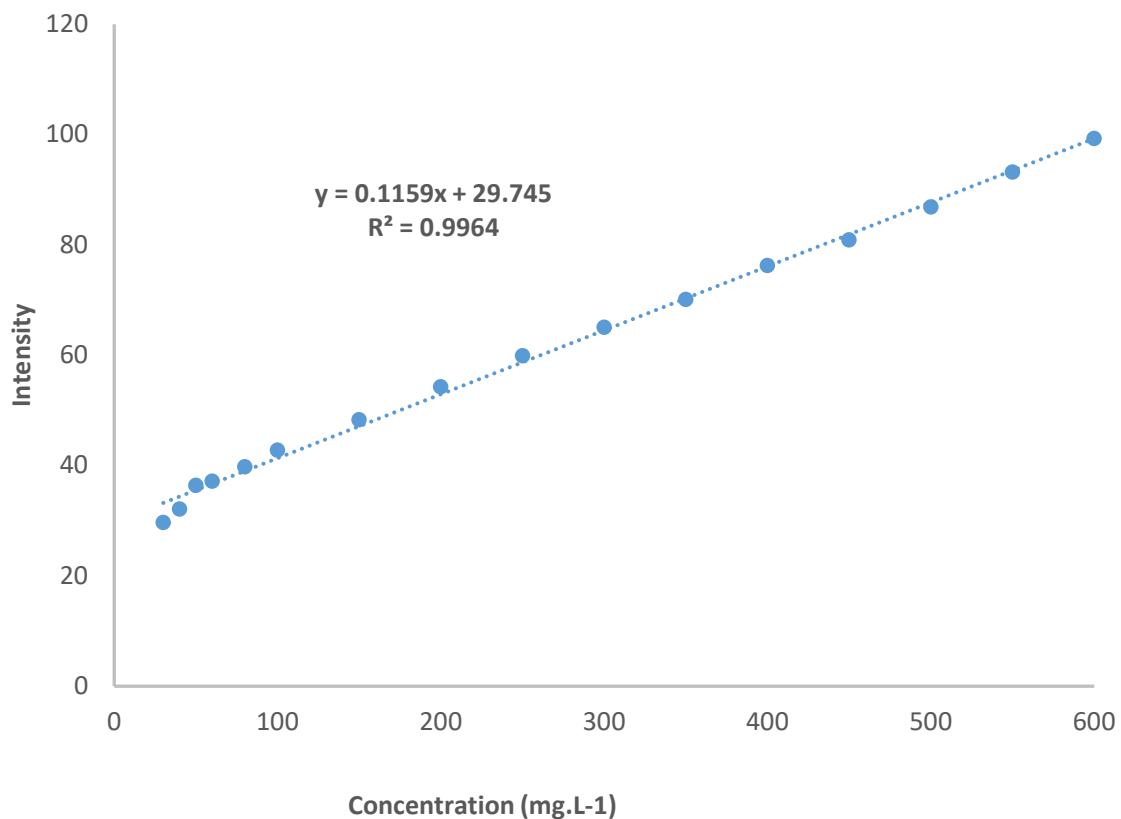


Fig. S5. The color change upon different concentrations during obtaining the calibration graph.

