Electronic Supporting Information

Fabrication of paper-based analytical devices optimized by central composite design

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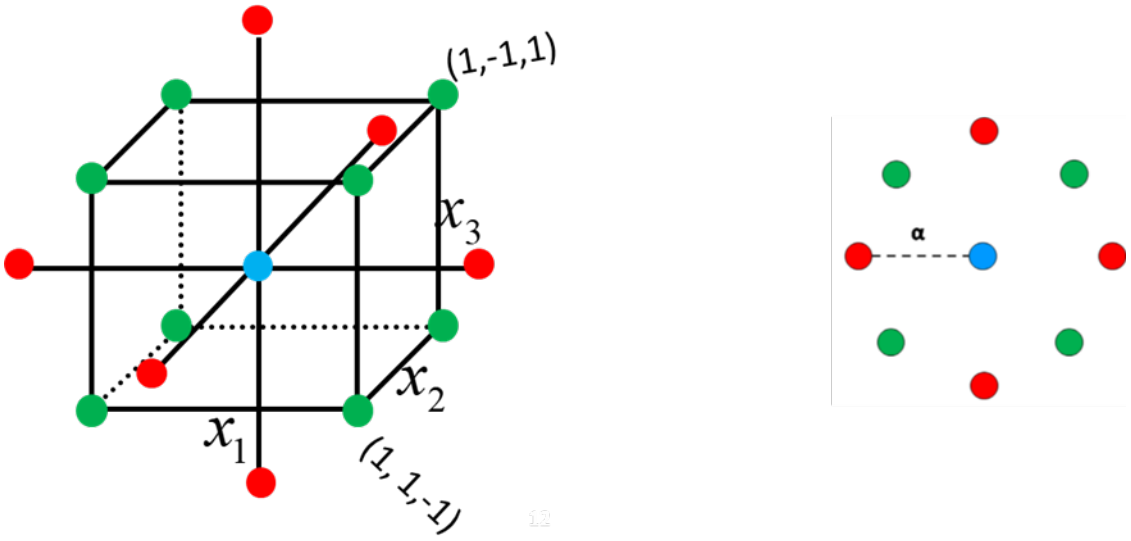
a)



b)

$$\mathbf{D} = \begin{bmatrix} x_1 & x_2 & x_3 \\ -1 & -1 & -1 \\ -1 & -1 & 1 \\ -1 & 1 & -1 \\ -1 & 1 & 1 \\ 1 & -1 & -1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \\ 1 & 1 & 1 \\ -\alpha & 0 & 0 \\ \alpha & 0 & 0 \\ 0 & -\alpha & 0 \\ 0 & \alpha & 0 \\ 0 & 0 & -\alpha \\ 0 & 0 & \alpha \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Factorial points

Star points

Central points

Figure. S1. a) A graphical representation of a three-factor circumscribed central composite design (CCCD); b) the experimental matrix of CCCD representing the factorial points, Star points and central points.

Table S1

Experimental matrix and the experimentally obtained responses for central composite design (CCD). The following is a list of the codes used to describe the relevant parameters:
A: Area length (mm) of the device
B: Area width (mm) of the device
C: Sampling volume (μL)
D, E, F: Printing cycles of assay reagents PVA, NH_4OH, and $AgNO_3$
Response: Difference of blue color intensity between respective sample and a blank

Run order	A	B	C	D	E	F	Response (ΔB)
1	2.4	0	0	0	0	0	95.7
2	1	-1	-1	-1	-1	1	89.4
3	-1	1	1	-1	1	1	104.9
4	0	0	0	-2.33	0	0	75.5
5	-1	-1	1	-1	-1	1	150.7
6	-1	1	1	1	1	-1	73.5
7	1	1	-1	-1	1	1	115.4
8	1	1	1	-1	-1	1	136
9	0	-2.4	0	0	0	0	109.7
10	1	-1	-1	1	-1	-1	55.2
11	-1	1	-1	1	-1	-1	55.6
12	1	1	-1	1	-1	1	80
13	0	0	0	0	0	2.33	137.8
14	1	-1	1	1	-1	1	132
15	-1	1	1	1	-1	1	130.3
16	1	1	1	1	-1	-1	88.7
17	0	2.4	0	0	0	0	90.3
18	1	-1	-1	-1	1	-1	80.4
19	-1	1	-1	1	1	1	129.6
20	1	1	-1	1	1	-1	87.3
21	-1	-1	1	-1	1	-1	95.7
22	-1	-1	-1	1	1	-1	93.3
23	-1	1	1	-1	-1	-1	69.6
24	0	0	0	0	2.33	0	107.6

25	0	0	-2.4	0	0	0	110.1
26	1	-1	-1	1	1	1	87.5
27	-1	1	-1	-1	-1	1	83.4
28	-1	1	-1	-1	1	-1	86.9
29	0	0	0	0	-2.33	0	70.2
30	1	-1	1	1	1	-1	88.3
31	1	-1	1	-1	-1	-1	62.5
32	0	0	2.4	0	0	0	161.7
33	0	0	0	0	0	-2.33	22.1
34	-1	-1	-1	-1	-1	-1	77.7
35	1	1	-1	-1	1	-1	73.2
36	-1	-1	-1	-1	1	1	110
37	1	-1	1	-1	1	1	100
38	1	1	1	1	1	1	156.2
39	-1	-1	-1	1	-1	1	111.1
40	0	0	0	2.33	0	0	122.6
41	-1	-1	1	1	1	1	165
42	1	1	1	-1	1	-1	107.3
43	-2.4	0	0	0	0	0	122.3
44	-1	-1	1	1	-1	-1	91.4
45	0	0	0	0	0	0	113.4
46	0	0	0	0	0	0	110.8

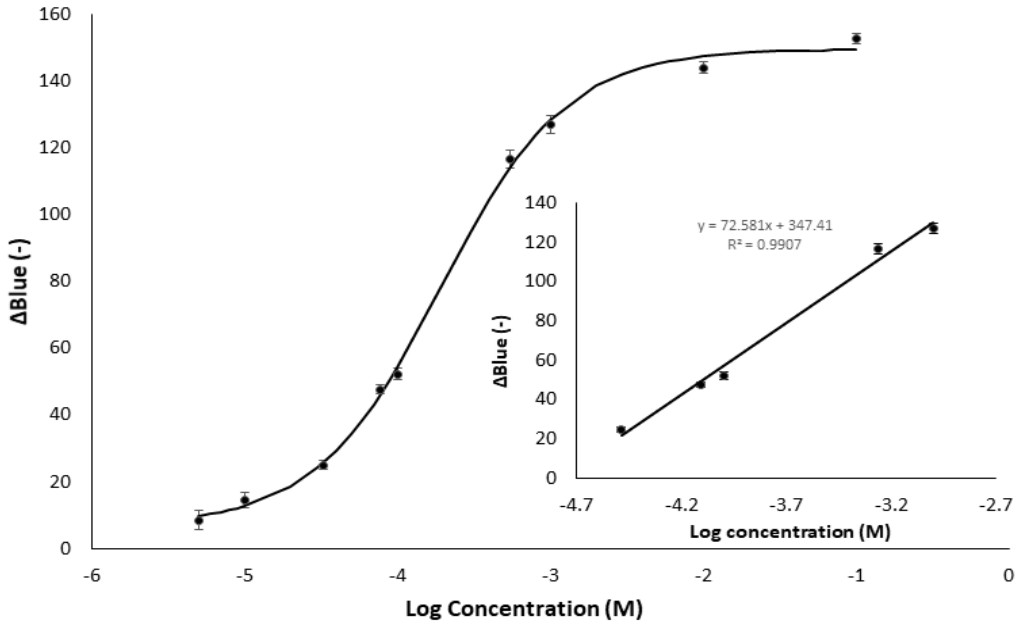


Figure S2. Calibration curve for isoniazid (n=5).