

Supplementary Material

Fabrication of Colorimetric Sensor Array

All 9 metalloporphyrins materials were purchased from Sigma-Aldrich Chemical Co.(Shanghai, China), including:

- (1) 5,10,15,20-Tetraphenyl-21H,23H-porphin,
- (2) 5,10,15,20-Tetraphenyl-21H,23H-porphine manganese(III) chloride,
- (3) 2,3,7,8,12,13,17,18-Octaethyl-21H,23H-porphine manganese(III) chloride,
- (4) 5,10,15,20-Tetrakis(4-methoxyphenyl)-21H,23H-porphine iron(III) chloride,
- (5) 5,10,15,20-Tetraphenyl-21H,23H-porphine iron(III) chloride,
- (6) 5,10,15,20-Tetraphenyl-21H,23H-porphine copper(II),
- (7) 5,10,15,20-Tetrakis(pentafluorophenyl)-21H,23H-porphyrin iron(III) chloride,
- (8) 5,10,15,20-Tetrakis(4-methoxyphenyl)-21H,23H-porphine cobalt(II),
- (9) 5,10,15,20-Tetraphenyl-21H,23H-porphine zinc, synthetic, low chlorine.

All 3 pH indicators were purchased from Sinopharm Chemical Reagent Co., Ltd. (Shanghai, China), including:

- (10) Bromothymol Blue,
- (11) Bromocresol Green,
- (12) Neutral Red.

The Molecular structure of dyes in the same order is shown in the Fig. 5.

Common pH indicator dyes change color in response to changes in the proton (Brønsted) acidity or alkalinity of their environment. After data acquisition, we obtain color difference map. Color-difference maps were obtained from the scanned RGB images by digitally subtracting the image

before exposure to analytes from the image after exposure, using a 314-pixel average from the center of each pigment spot (thus avoiding subtraction artifacts at the periphery of the spots) as follows.

$$\Delta R = |R_a - R_b| \quad (7)$$

$$\Delta G = |G_a - G_b| \quad (8)$$

$$\Delta B = |B_a - B_b| \quad (9)$$

Where, a represents after, b represents before. ΔR , ΔG , ΔB are the color difference. The color change profile is, then, simply a 3 N-dimensional vector (where N = number of pigments) that can be easily analyzed by standard statistical and chemometric techniques. The large number of color-difference variables in most data sets encountered in color difference chemometrics often renders the prediction of a dependent variable complicated; however, by the use of suitable projection or selection techniques the problem may be minimized.

Figure Caption

Fig.5 Molecular structure of chemical dyes used in the sensor array in the order as shown in figure related to those from the supplementary information.