Supplementarymaterial

Fabrication of Colorimetric Sensor Array

In our previous experiment, many materials were tested to choose the optimum chemically responsive dyes. Eventually ninemetalloporphyrins materials and three pH indicators were accepted in this work.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-porphi`ne 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-methoxyhenyl)-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,
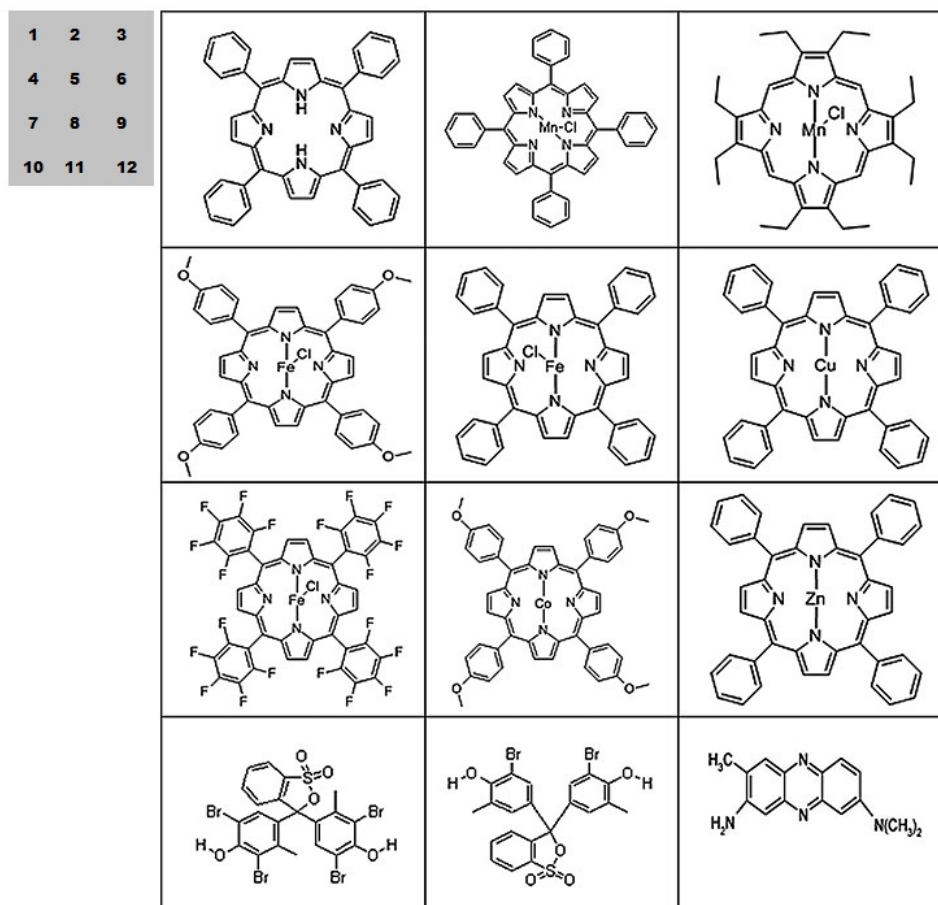
China), including:

(10) Bromothymol Blue,

(11) Bromocreslo Green,

(12) Neutral Red.

The Molecular structure of dyes in the same order is shown in the Fig.S6.

[Here for Fig.S6]

Figure Caption

Fig.S6 Molecular structure of chemical dyes used in the sensor array in the order as shown in figure related to those from the supporting information.

Common pH indicator dyes change color in response to changes in the proton (Brønsted) acidity or alkalinity of their environment. The details steps of fabricating colorimetric sensor were arranged as follow: (1) each chemically responsive dye (20mg) was dissolved in 10mL of chloroform solution. The mixture was preprocessed for 2h by ultrasound at room temperature, and eventually obtained 12 kinds of pigments solution. (2) Each pigment solution was spotted on C2 reverse phase silica gel plates (Merck KGaA, Frankfurter, Germany) using 0.1 μL microcapillary tubesconstructing a 4 × 3 sensor array. (3) Once printed, the arrays were stored in a nitrogen-flushed glove bag before the further usage in this experiment.

After data acquisition, we obtain color difference map. Color-difference maps were obtained from the scanned RGB imagesby digitally subtracting the image before exposure to analytes from theimage after exposure, using a 314-pixel average from the center of eachpigment spot (thus avoiding subtraction artifacts at the periphery of thespots) as follows.

$$\Delta R = |R_a - R_b| \tag{4}$$

$$\Delta G = |G_a - G_b| \tag{5}$$

$$\Delta B = |B_a - B_b| \tag{6}$$

Where, a represents after, b represents before.ΔR, ΔG, ΔBare the colordifference.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 andchemometric techniques. The large number ofcolor-difference variables in most data sets encountered in colordifference chemometrics often renders the prediction of a dependentvariable complicated;however, by the use of suitable projection orselection techniques the problem maybe minimized.

Reference Measurement of chicken freshness

TVB-N content in chicken was measured by a steam distillation method.Right after scanning initial and final images of the chicken meat samples, fat was removed from the tissue samples and was ground. Ten grams of the ground chicken was taken into a beaker, and blended with 100 mL distilled water, and impregnated still for 30 min and shook the beaker every 10 min. The solution was centrifuged at 3000 rpm for 10 min, and the homogenate was filtered through the filter paper. Five milliliter of filtrate was made alkaline by adding 5 mL of 10 g L^{-1} magnesia (MgO). Steam distillation was performed using Kjeldahl distillation unit (Shanghaijianqiang glass Co., China) for 5 min. The distillate was absorbed by 10 mL of 20 g L^{-1} boric acid, and then titrated with 0.1 mol L^{-1}HCl. TVB-N content was calculated using following formula and expressed with a unit of mg/100 g.

$$TVB - NContent\ (mg/100g) = \frac{(V_1 - V_2) \times c \times 14}{m \times 5/100} \times 100 \qquad (7)$$

Where, $V_1$is thesample titration volume (mL), $V_2$is the blank titer (mL), c is the concentration of the HCL(mol/L), m is the weight of the ground sample (g).