Electronic Supplementary Information

Colorimetric sensor strips for formaldehyde assay utilizing fluoral-p decorated polyacrylonitrile nanofibrous membranes

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Fig. S1

The fractal dimension (D) was calculated by tow steps, first, calculating the V_{mono} based on the BET theory (equation 1),

$$\frac{1}{V[(P_0/P)-1]} = \frac{c-1}{cV_{mono}}\left(\frac{P}{P_0}\right) + \frac{1}{cV_{mono}} \quad (1)$$

Where, V is the amount of N_2 adsorbed at each equilibrium pressure, P_0 is the saturation pressure V_{mono} is the amount adsorbed of monolayer coverage, and c is the constant. When temperature is constant, the plot of the $1/V[(P/P_0)-1]$ against P/P_0 reconstructed from the N_2 absorption isotherm should be a straight line, but in fact, only when P/P_0 is in the range of 0.05 to 0.35, the figure displayed a good linearity. Thus we could calculate the slope (k) and intercept (b) from the figure, and then calculate the V_{mono} based on the following equations (2 and 3).

$$V_{mono} = \frac{1}{k+1} \quad (2)$$

$$c = 1 + \frac{k}{b} \quad (3)$$

Then, the calculation of D was according to the modified FHH theory of multilayer gas adsorption:

$$\ln\left(V/V_{mono}\right) = S[\ln\left(\ln\left(p_0/p\right)\right)] + \text{constant} \quad (4)$$

A plot of $\ln(V/V_{mono})$ versus $\ln(\ln(P_0/P))$ shows a linear trend, and the slope S could be used to calculate D utilizing the expression: S = D-3, which was according to the dominant forces of liquid-gas surface tension at high coverage.

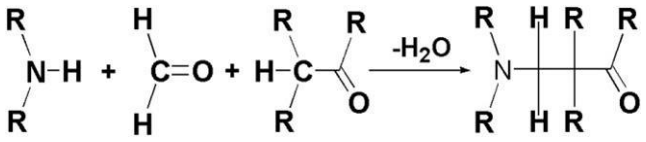

Fig. S2 The mechanism of Mannich reaction.

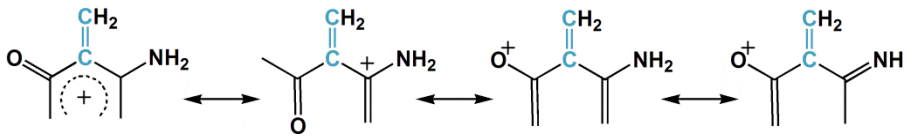

Fig. S3 The resonance states of intermediates **2**

Table S1 The sensitivity comparison of colorimetric strips and filter paper

	Control				60 ppb				ΔR_{417}	ΔE^*
	R_{417}	L*	a*	b*	R_{417}	L*	a*	b*		
Strips	**0.841**	**96.2**	**-8.1**	**-2.3**	**0.694**	**92.4**	**-8.4**	**-0.1**	**0.147**	**4.31**
Paper	**0.836**	**95.6**	**-8.0**	**-1.6**	**0.756**	**93.7**	**-8.6**	**-0.4**	**0.080**	**2.32**