Electronic Supplementary Information

Volatile alcohols-responsive visual sensors based on P(HEMA-co-MA)-infiltrated SiO_2 inverse opal photonic crystals

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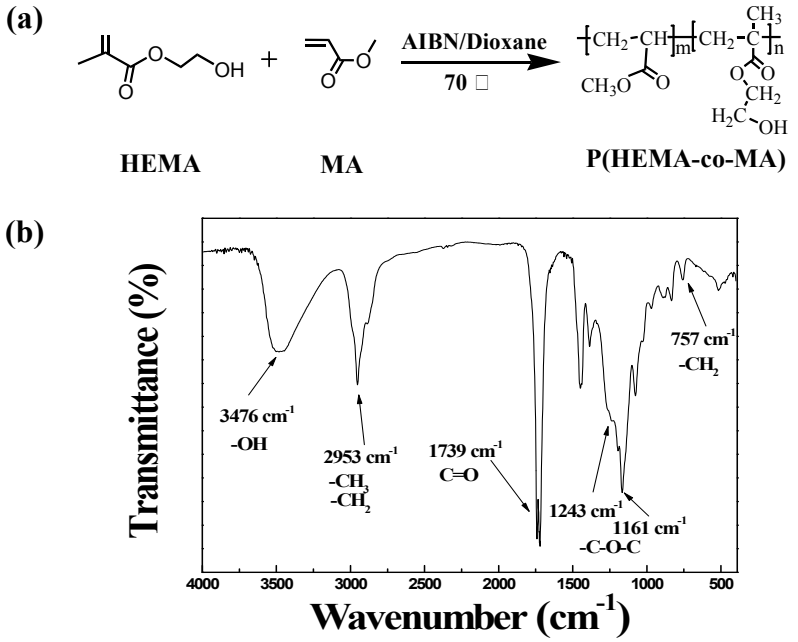

Fig. S1 (a) The synthesis procedure of P(HEMA-co-MA). (b) FT-IR spectrum of the copolymer P(HEMA-co-MA). It clearly shows characteristic peaks of the copolymer, 3476 cm^{-1} (O–H stretching), 1739 cm^{-1} (C=O stretching), 1243 cm^{-1} and 1161 cm^{-1} (C–O–C stretching). The FT-IR results indicated the successful synthesis of copolymer P(HEMA-co-MA).

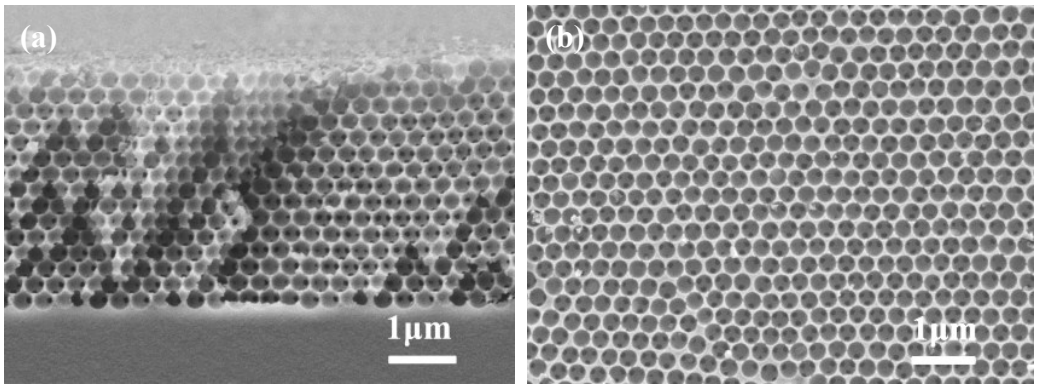

Fig. S2 (a) The cross sectional SEM image of SiO_2 IOPC and the top-view SEM image of the P(HEMA-co-MA)-SiO_2 IOPC. The thickness of SiO_2 IOPC is about 3.5 μm.

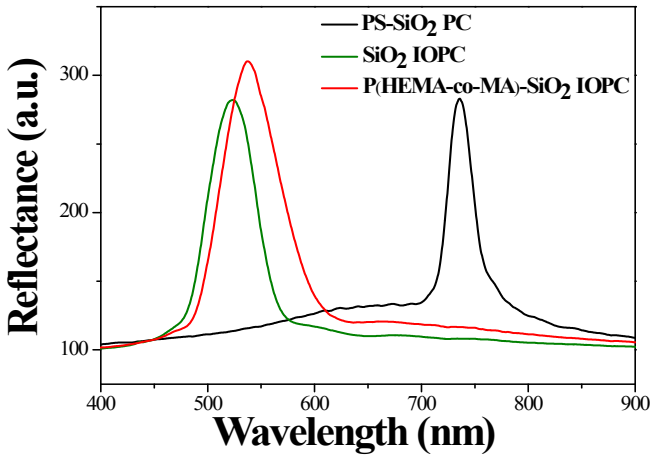

Fig. S3 Reflectance spectra of the as-prepared co-assembled PS-SiO_2 PC, SiO_2 IOPC and P(HEMA-co-MA)-SiO_2 IOPC.

The reflectance spectra measured at normal incidence by a fiber optic spectrophotometer were employed to characterize the stopband of PC. As can be clearly seen from the spectra, the stopband of PS-SiO_2 PC occurs at 734 nm. After the removal of PS spheres, the stopband of SiO_2 IOPC shifted to 522 nm because of a lower effective refractive index caused by air spheres instead of polymer spheres. There is a shift of 15 nm in the reflectance spectra after P(HEMA-co-MA) molecules infiltrated into the SiO_2 IOPC because small quantities of P(HEMA-co-MA) may induce tiny variation in the effective refractive index of PC.

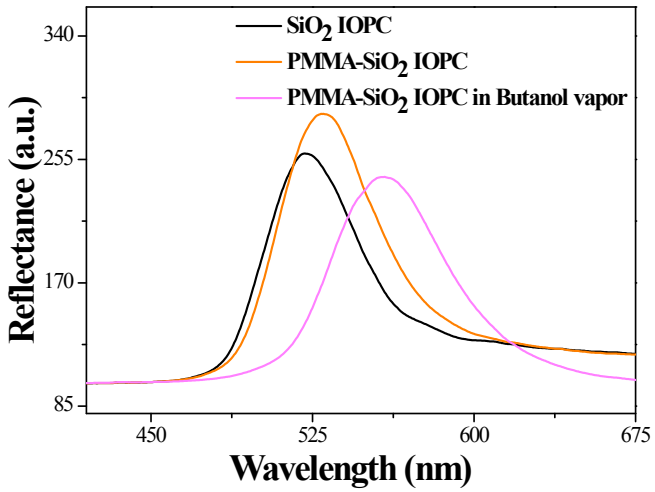

Fig. S4 Reflectance spectra of the SiO_2 IOPC, PMMA-SiO_2 IOPC and PMMA-SiO_2 IOPC exposed to the saturated vapor of butanol. It shows that the stopband of SiO_2 PC occurs at 522 nm. After the infiltration of PMMA (PMMA-SiO_2 IOPC), the stopband shifted to 530 nm. When the PMMA-SiO_2 IOPC was exposed to butanol vapor, the stopband red shifted to 558 nm.

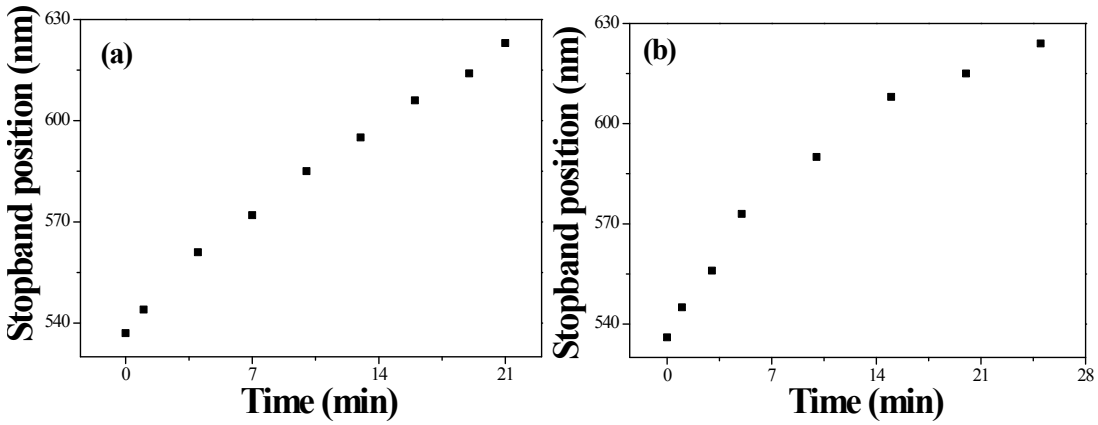

Fig. S5 The stopband position of P(HEMA-co-MA)-SiO_2 IOPC sensor when exposed to the saturated vapors of isopropanol (a) and butanol (b).

Table S1 The refractive indices (n_D^{20}) and solubility parameter (δ) of some solvents

Solvents	n_D^{20}	δ [(cal/cm^3)$^{1/2}$]
H_2O	1.3330	23.4
Acetone	1.3587	9.8
Diethyl ether	1.3524	7.4
Chloroform	1.4458	9.3
Dichloromethane	1.4244	9.7
Benzene	1.5011	9.2
Toluene	1.4969	8.9
p-Xylene	1.4958	8.8
Methanol	1.3284	14.5
Ethanol	1.3614	12.9
Isopropanol	1.3776	11.5
Butanol	1.3993	11.4