

## **Supplementary data**

**Figure S1.** The Effect of methanol, Na<sup>+</sup> and pH value on the sensitivity MBI.

**Figure S2.** The matrix effect of water samples on the sensitivity of MBI.

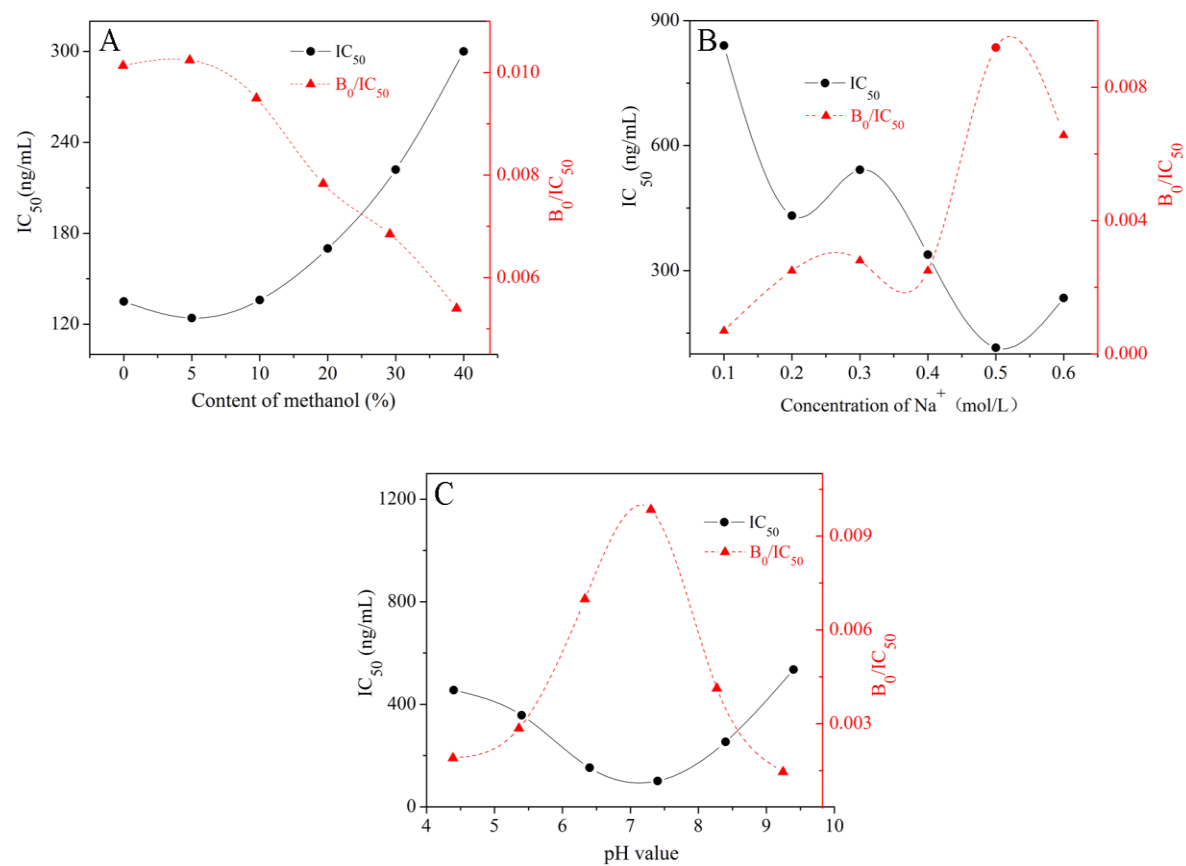
**Figure S3.** The correlation between the MBI and HPLC for BBP.

**Table S1.** The sampling coordinates of environmental water samples.

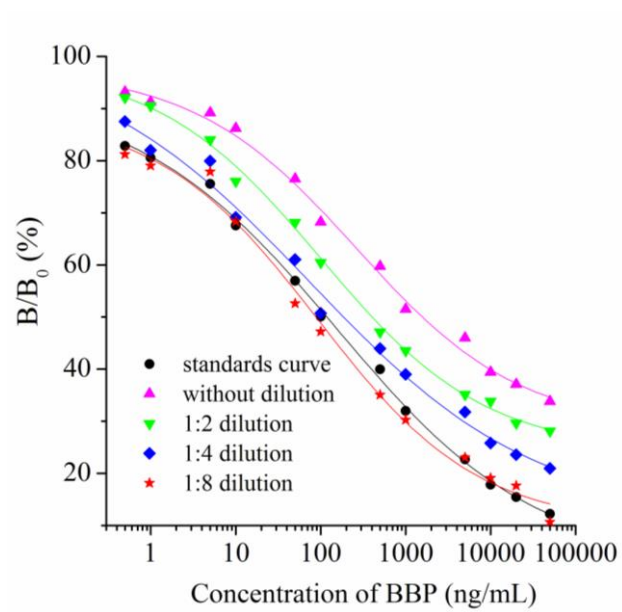
**Table S2.** The key parameters for the proposed MBI.

**Table S3.** The optimal concentration of antigen and antibody.

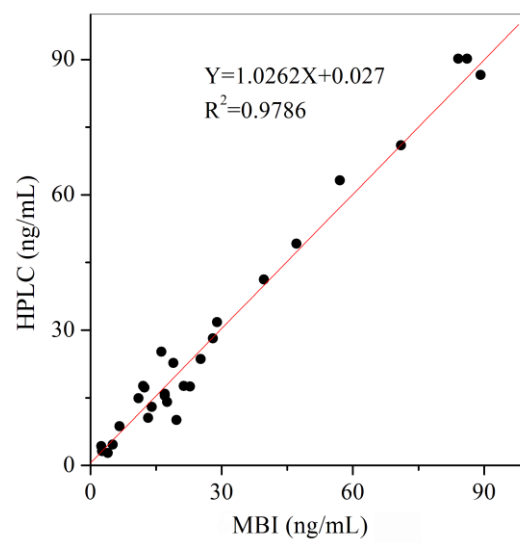
**Table S4.** The results of cross-reactivity for MBI.



**Figure S1.** The Effect of methanol (A),  $Na^+$  (B) and pH value (C) on the sensitivity of MBI.



**Figure S2.** The matrix effect of water samples on the sensitivity of MBI.



**Figure S3.** The correlation between the MBI and HPLC for BBP (The LOD was 0.15 ng/mL for HPLC).

**Table S1.** The sampling coordinates of environmental water samples.

Sample	Coordinates	Sample	Coordinates
S1	E119°22'21.02" N32°11'2.54"	S19	E119°30'13.39" N32°10'45.86"
S2	E119°23'27.70" N32°11'29.68"	S20	E119°29'57.81" N32°10'12.27"
S3	E119°24'7.87" N32°11'57.39"	S21	E119°29'45.45" N32°09'20.99"
S4	E119°24'12.82" N32°12'16.74"	S22	E119°30'14.64" N32°08'21.44"
S5	E119°25'12.18" N32°12'27.74"	S23	E119°30'24.51" N32°11'6.78"
S6	E119°25'2.28" N32°11'30.20"	S24	E119°31'14.84" N32°11'31.05"
S7	E119°25'46.88" N32°11'34.97"	S25	E119°13'27.51" N32°10'56.63"
S8	E119°24'53.63" N32°10'45.74"	S26	E119°32'45.34" N32°10'17.48"
S9	E119°24'54.25" N32°09'41.90"	S27	E119°33'29.33" N32°09'48.26"
S10	E119°26'20.57" N32°13'3.90"	S28	E119°33'16.35" N32°09'7.97"
S11	E119°12'41.93" N32°12'15.31"	S29	E119°33'4.61" N32°08'8.32"
S12	E119°26'29.62" N32°12'14.80"	S30	E119°33'23.15" N32°07'42.66"
S13	E119°27'29.05" N32°11'55.53"	S31	E119°34'0.94" N32°09'59.84"
S14	E119°27'44.57" N32°11'10.59"	S32	E119°34'48.67" N32°10'17.18"
S15	E119°27'40.84" N32°09'33.26"	S33	E119°35'10.30" N32°11'1.65"
S16	E119°27'32.09" N32°08'27.24"	S34	E119°41'51.12" N32°10'43.98"
S17	E119°27'55.71" N32°11'35.19"	S35	E119°42'18.26" N32°11'57.15"
S18	E119°29'3.90" N32°11'29.59"	S36	E119°40'33.35" N32°12'47.55"

**Table S2.** The key parameters for the proposed MBI.

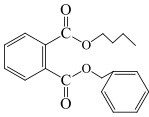
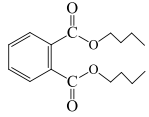
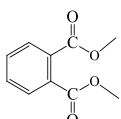
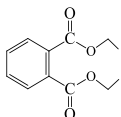
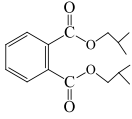
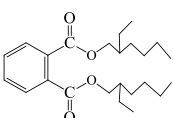
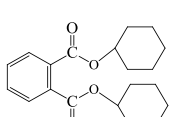
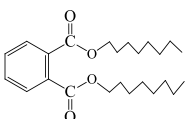
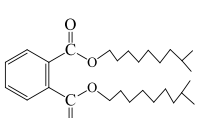
Factor	Parameter	Factor	Parameter
Magnetic antigen probe	0.6 ng/mL	Methanol ( $v/v$ , %)	5
Biotinylated antibody probe	2.5 ng/mL	Na <sup>+</sup> (mol/L)	0.5
Streptavidin-HRP	18.9 ng/mL	pH value	7.4

**Table S3.** The optimal concentration of antigen and antibody.

		BBP-OVA (μg/mL)								
		10.6	5.3	2.65	10.6	5.3	2.65	10.6	5.3	2.65
		Dilution ratio of magnetic antigen probe								
		1:2000			1:4000			1:8000		
Biotinylated antibody probe (ng/mL)	10	2.648	2.204	1.739	2.105	1.579	1.421	1.789	1.378	1.012 69.8% <sup>a</sup>
	5	2.365	1.856	1.548	1.714	1.359	1.256	1.556	1.126	0.894
	2.5	2.106	1.366	<b>1.056/ 65.4%</b> <sup>a</sup>	1.553	1.142	0.884	1.341	0.879	0.578
	1.25	1.896	1.21	0.897	1.482	<b>1.005/ 70.3%</b>	0.674	1.289	0.523	0.245
	0.625	1.483	1.136	0.699	1.189	0.752	0.389	<b>1.045/ 64.8%</b>	0.312	0.098

<sup>a</sup> Inhibition: The 10 μg/mL BBP was used to test the inhibition experiment when the value of B<sub>0</sub> was approximately 1.0.

**Table S4.** The results of cross-reactivity for MBI.

Compound	Structure	IC <sub>50</sub> (ng/mL)	CR (%)
Benzyl butyl phthalate (BBP)		119.61	100
Dibutyl phthalate (DBP)		2682.93	4.5
Dimethyl phthalate (DMP)		4514.03	2.7
Diethyl phthalate (DEP)		3781.25	3.2
Diisobutyl phthalate (DIBP)		5873.79	2.0
Bis (2-ethyl hexyl) phthalate (DEHP)		3878.21	3.1
Dicyclohexyl phthalate (DCHP)		>10000	<1.2
Di-n-octyl phthalate (DnOP)		>10000	<1.2
Diisodecyl phthalate (DIDP)		>10000	<1.2