Electronic Supporting Information for

On site marine oil spillage monitoring probes formed from fixing oxygen sensor into hydrophobic/oleophilic porous matrials for early stage spotty pollution warning

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Fig. S1 Oil spillage monitoring system based on oil oxygen detecting probe sealed in hydrophobic and oleophilic porous materials with paraffin film, schematic of the oil spillage online monitoring system.

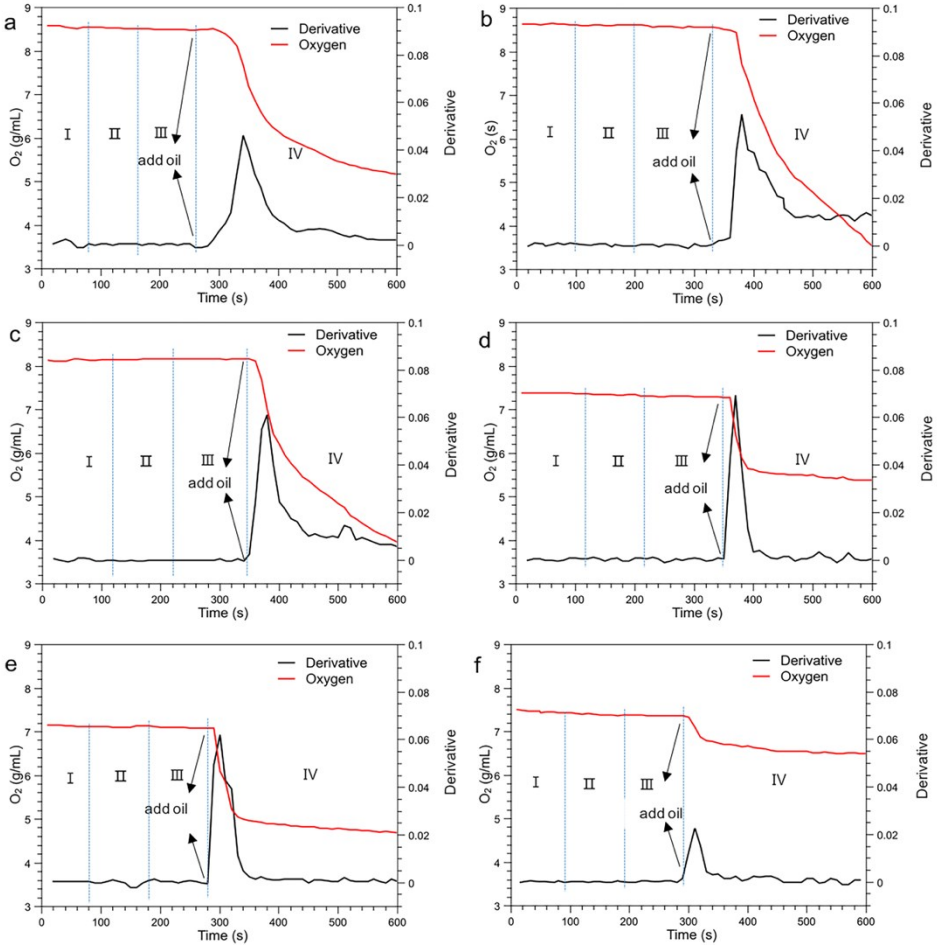

Fig. S2 Signals monitored by the oxygen consumption sensor probe fixed with 2 layers of Material A for varied types of oil spillage (50 ml/0.8L) in simulated sea water: (a) lubricating oil ; (b) corn oil ; (c) soybean oil; (d) *n*-hexane; (e) petroleum ether; and (f) Toluene.

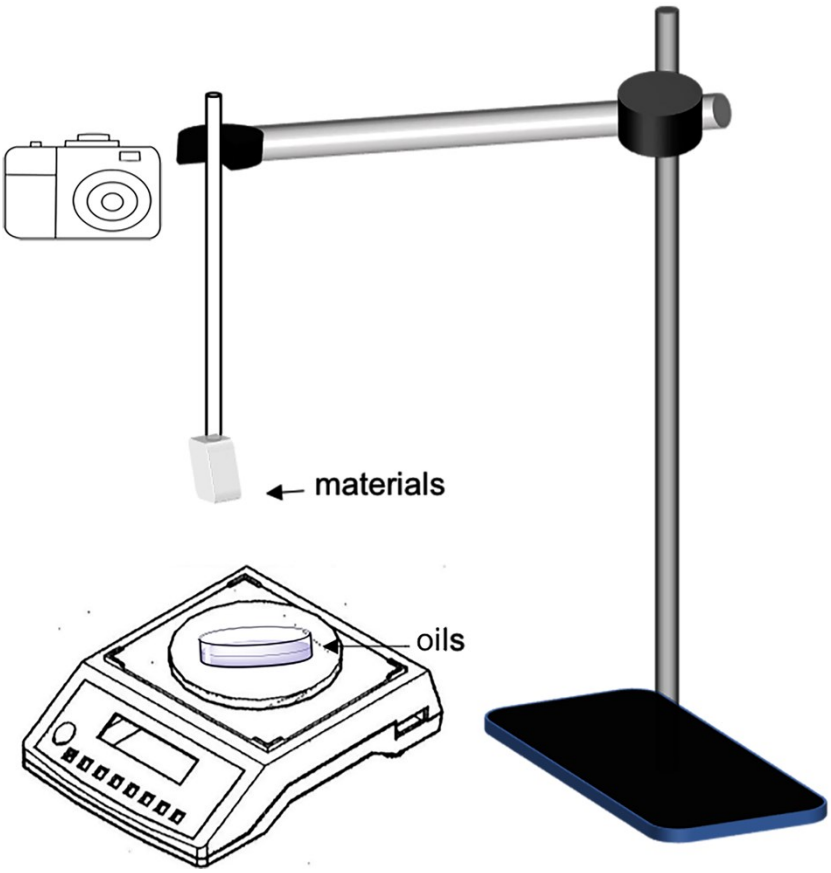

Fig. S3 A schematic diagram to experimental setup to determine the dynamic oil absorbing speed of porous materials to spilled oils

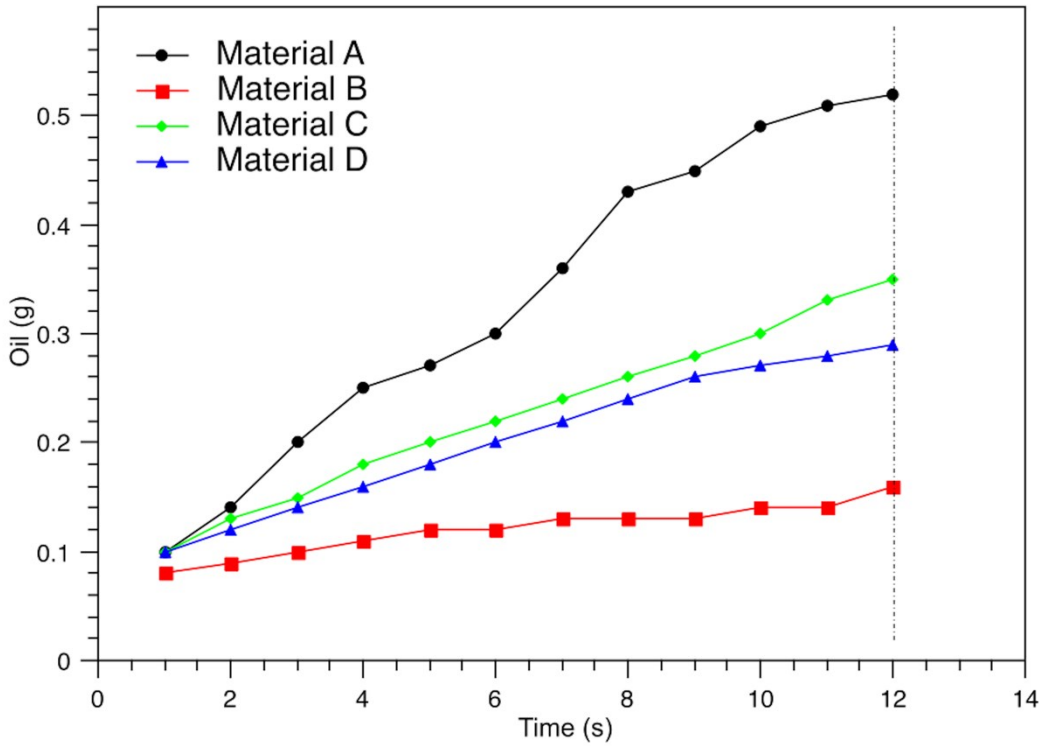

Fig. S4 A schematic diagram to oil pollution adsorption curves of different materials

Table S1 Impact of type of oil adsorbing porous materials on the parameters of the monitored signals during an on site 50 ml/0.8L (50 g/L) spillage of soybean oil.

Materials	Peak height	RSD (%)	Half width	RSD (%)	Peak area	RSD (%)
A	0.080±0.003	3	33±1	3	4.90±0.01	0.2
B	0.020±0.002	10	56±3	6	2.2±0.2	10
C	0.0080±0.0003	4	33±2	6	0.40±0.03	8
D	0.0300±0.0008	3	77±5	6	2.1±0.2	8

Table S2 Impact of thickness of oil Material A on the parameters of the monitored signals during an on site 50 ml/0.8L (50 g/L) spillage of soybean oil.

Material A	Peak height	RSD (%)	Half width	RSD (%)	Peak area	RSD (%)
0	0.08±0.01	13	25±1	4	2.4±0.3	13
1	0.090±0.002	3	29±1	2	3.7±0.3	8
2	0.080±0.003	3	33±1	3	4.90±0.01	0.2
3	0.060±0.003	4	57±1	1	4.5±0.1	3

Table S3 Repeatability and Reliable lower detection limit of the probe fixed with two layers of Material A for soybean oil spillage.

SD/Oil(g/L)	1.0	1.5	2.0	3.0	5.0	12.5	25.0	50.0	$3\delta_{1+2/max.}$	Oil（g/L）
δ_1	0.02	0.01	0.02	0.04	0.03	0.04	0.04	0.02		—
δ_2	0.03	0.01	0.04	0.01	0.01	0.02	0.01	0.04		—
δ_{1+2}	0.05	0.02	0.06	0.05	0.04	0.06	0.05	0.06	0.18	1.1

Table S4 Repeatability and Reliable lower detection limit of the probe fixed with no Material A for soybean oil spillage. [a]

SD/ Oil(g/L)	1.0	5.0	12.5	25	50	$3\delta_{1+2/max}$[f]	Oil（g/L）
δ_1[b]	0.01	0.31	0.45	0.67	0.21	—	—
δ_2[c]	0.01	0.06	0.03	0.03	0.06	—	—
δ_{1+2}[d]	0.02	0.37	0.48	0.70	0.27	2.1	36.5

[a] The reliable lower oil detection limit of the probe was figured out from corresponding curve between signal peak area and oil spillage amounts in Fig. 7.

[b] δ_1 is the standard deviation of signal peak areas obtained from repeated oil spillage experiments at varied spillage amounts.

[c] δ_2 is the standard deviations of the background signal peak areas without oil spillage.

[d] δ_{1+2} is the sum of δ_1 and δ_2.

[f] $3\delta_{1+2/max}$ is three times the maximum of δ_{1+2}. The reliable lower oil detection limit of the probe was figured out from corresponding curve between signal peak area and oil spillage amounts in Figure 7.

Table S5 Impact of oil type on the parameters of signals from the oxygen consumption sensor probe fixed with 2-layer Material A in fresh water.

Oils	Peak height	RSD (%)	Half width	RSD (%)	Peak area	RSD (%)
lubricating oil	0.040±0.002	5	47±1	2	2.2±0.1	5
corn oil	0.063±0.002	3	30.8±0.3	0.9	3.1±0.1	3
soybean oil	0.080±0.003	3	33±1	3	4.90±0.01	0.2
n-Hexane	0.060±0.001	2	27.8±0.5	2	1.70±0.01	0.6
petroleum ether	0.0700±0.0003	0.4	26.7±0.1	0.4	2.10±0.02	1
Toluene	0.020±0.001	5	27.5±0.4	1	0.70±0.01	1

Table S6 Impact of vibration intensity on the signal parameters of oxygen consumption sensor probe fixed with 2 layers of Material A.

vibration	Peak height	RSD (%)	Half width	RSD (%)	Peak area	RSD (%)
1	0.080±0.003	3	33±1	3	4.90±0.01	0.2
5	0.070±0.004	6	32±1	3	3.4±0.1	3
10	0.050±0.001	2	35±3	9	2.9±0.1	3
15	0.056±0.008	14	38±1	3	3.200±0.002	5