Supplementary Materials

Quantitative sampling of Iodinated X-ray contrast media in water by Diffusive gradients in thin-films technique

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Diffusion coefficients of ICMs in PES membrane

In Figure S1, the cell consisted of two compartments each with an interconnecting 1.5 cm diameter opening, and was specifically designed to accommodate the PES membrane and to prevent leakage of solution from one compartment to the other. A 2.5 cm diameter disc of PES membrane was placed between the openings and the whole assembly clamped together. 150 mL of carrier solution was introduced into one compartment (known as the receptor solution) and 150 mL of carrier solution containing 100 mg L^{-1} of the every ICMs introduced into the other (known as the source solution). Both compartments were stirred continuously during the experiments. 50 μL of sub-samples were removed from both compartments at intervals of 45 min over a period of 270 min. All the subsamples were analyzed by HPLC. The slope of the linear plot of the diffused amounts of ICMs in receptor compartment versus diffusion time was used to calculate the diffusion coefficient as the following equation

$$D = slope \cdot \Delta g / C \cdot A \qquad \text{(S1)}$$

where A is the exposed area of PES membrane (3.14 cm^2), Δg is the thickness of PES membrane (0.085 cm), and C is the concentration of ICMs initially present in the source compartment of the diffusion cell is effectively constant for short time.

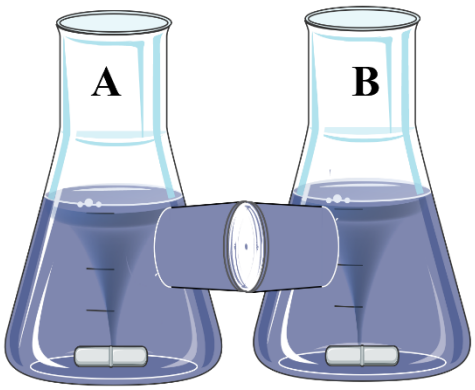

Figure S1 Diffusion cell.

Diffusive coefficients were corrected for 25 ˚C according to Stokes-Einstein equation.

$$\frac{D_1\eta_1}{T_1}=\frac{D_2\eta_2}{T_2} \quad \text{(S2)}$$

where D_1 and D_2 are diffusion coefficients at absolute temperature T_1 and T_2, respectively. η_1 and η_2 are viscosities of water at T_1 and T_2, respectively.

Adsorption mass of G-gel for ICMs

$$W=(C_i-C_f)\ V \quad \text{(S3)}$$

where W is the adsorption amount of the ICMs (mg), C_i and C_f are the initial and final concentrations of the ICMs (mg L^{-1}), respectively. V is the volume of the solution (L).

Elution efficiencies of ICMs from the loaded G-gel

EE%= (Eluted mass/*Adsorption mass)*×100% (S4)

Validation

The DGT device are validated by testing the relationship between the mass of the ICMs which were accumulated by graphene nanosheets (M) and the deployment time (t) using the DGT equation as follows:

$$M = D \cdot A \cdot C_{DGT} \cdot t / \Delta g \quad \text{(S5)}$$

C_{DGT} is the concentrations measured of the ICMs by DGT method, A and Δg are the area and thickness of a PES membrane, respectively.

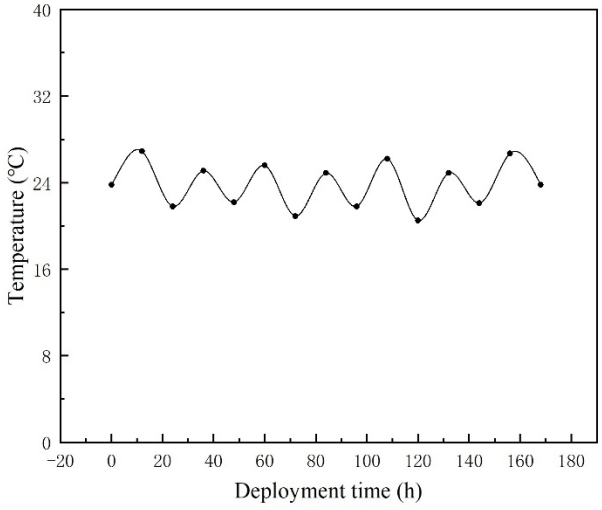

Figure S2 The change in water temperature over the 7-day deployment time.

Table S1 Physicochemical parameters and the ICMs contents of two water samples

Measured parameters	Water samples	
	Hospital sewage	Hospital drainage
Conductivity (μs cm^{-1}) [a]	2019	1932
Salinity (ppt) [a]	0.79	0.95
Oxidation-reduction potential (mV) [a]	293	367
Total dissolved solids (mg L^{-1}) [a]	770	571
Dissolved organic carbon (mg C L^{-1}) [b]	15.7±1.6	25.9±3.2
Chemical oxygen demand (mg L^{-1}) [c]	190.8±57.9	267.2±62.9
pH	7.8±0.7	7.7±0.9

[a] Conductivity, salinity, oxidation-reduction potential and total dissolved solids were measured by pen conductivity meter (ST10C-B), pen salinity meter (ST20S), pen ORP meter (ST10R)and pen TDS meter (ST10T-B), respectively (Ohaus, Canada).

[b] Dissolved organic carbon was measured using a TOC analyzer (Dohrmanne DC-190, GE, USA).

[c] Chemical oxygen demand was measured by potassium dichromate method.

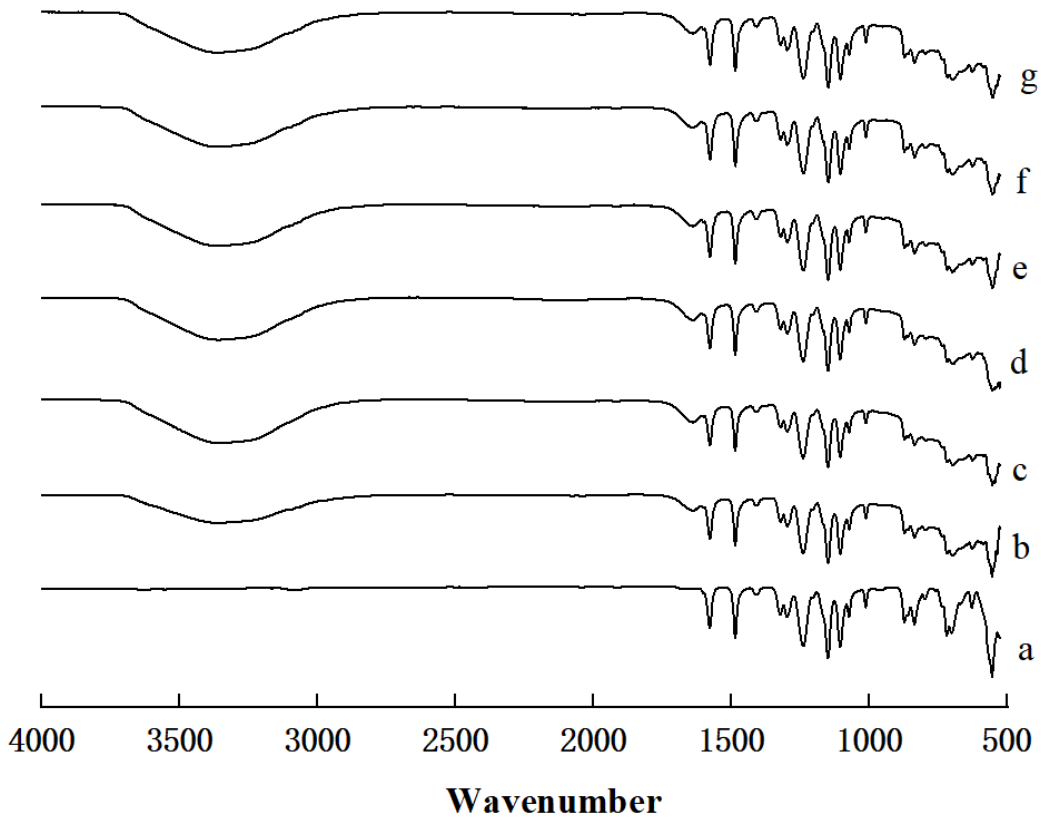

Figure S3 FT-IR spectra of PES membranes before and after adsorption the six ICMs.

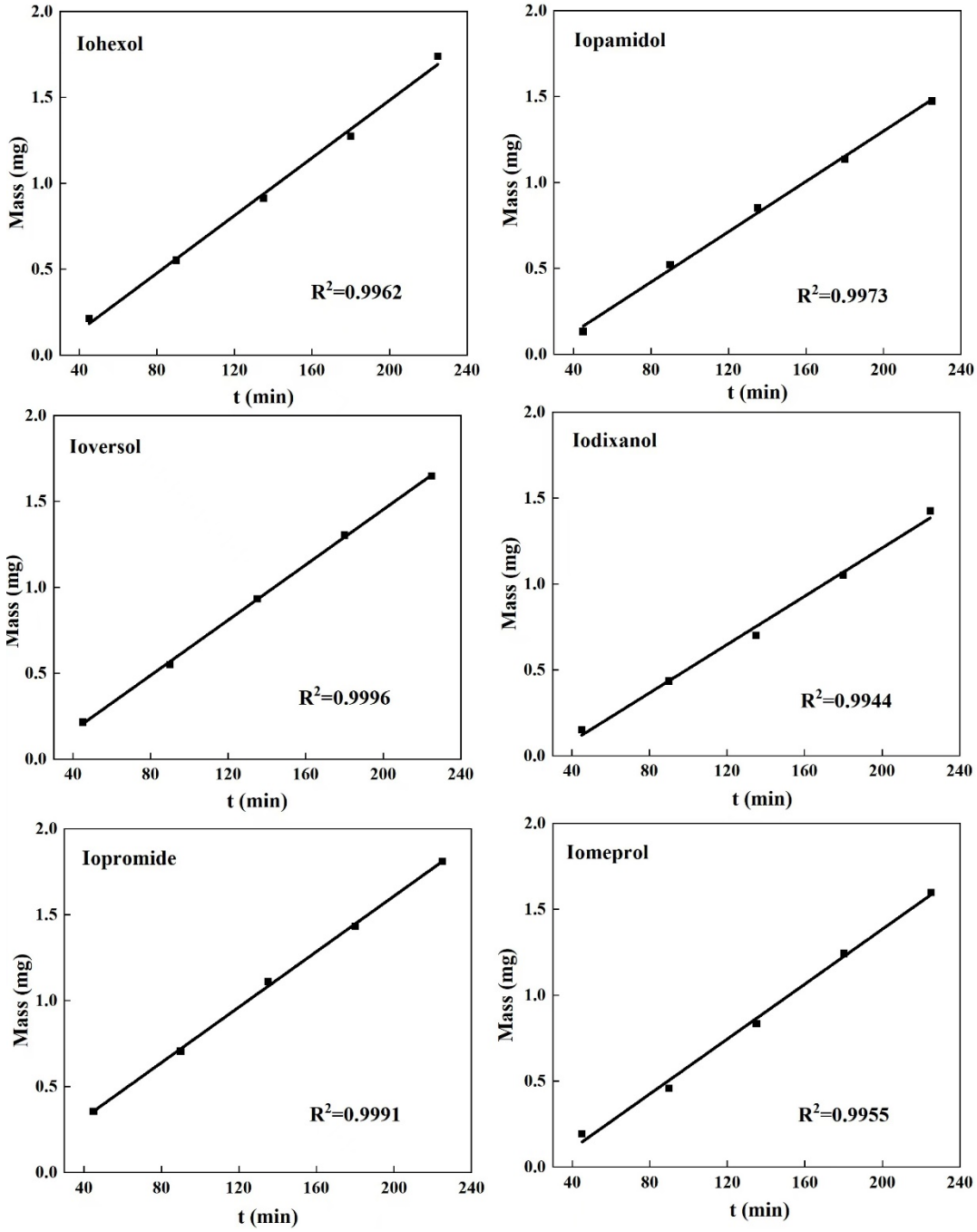

Figure S4 Linear relationship between the masses of the six ICMs diffused through the PES membrane *vs*. diffusion time.

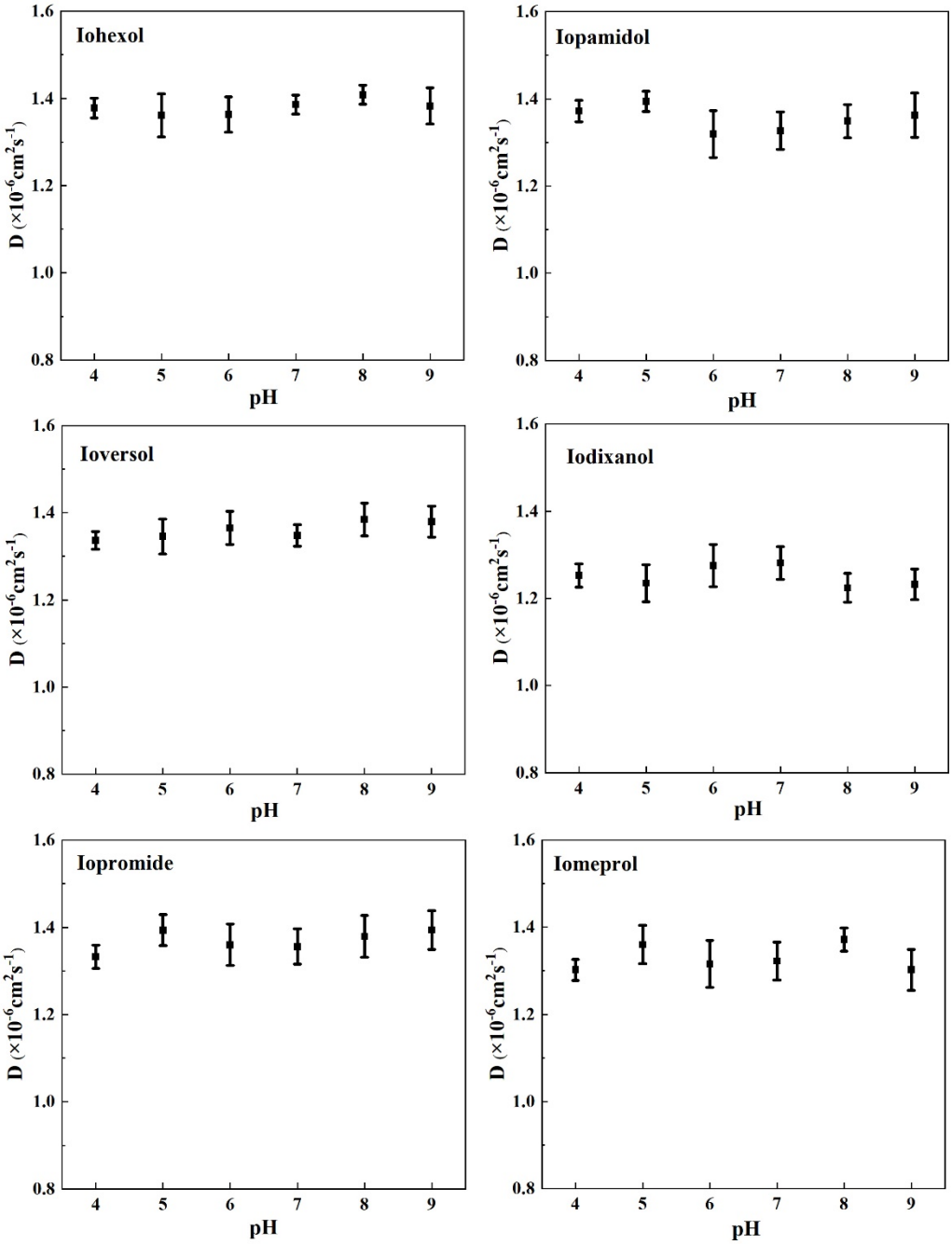

Figure S5 Effects of pH on diffusion coefficients of the six ICMs.

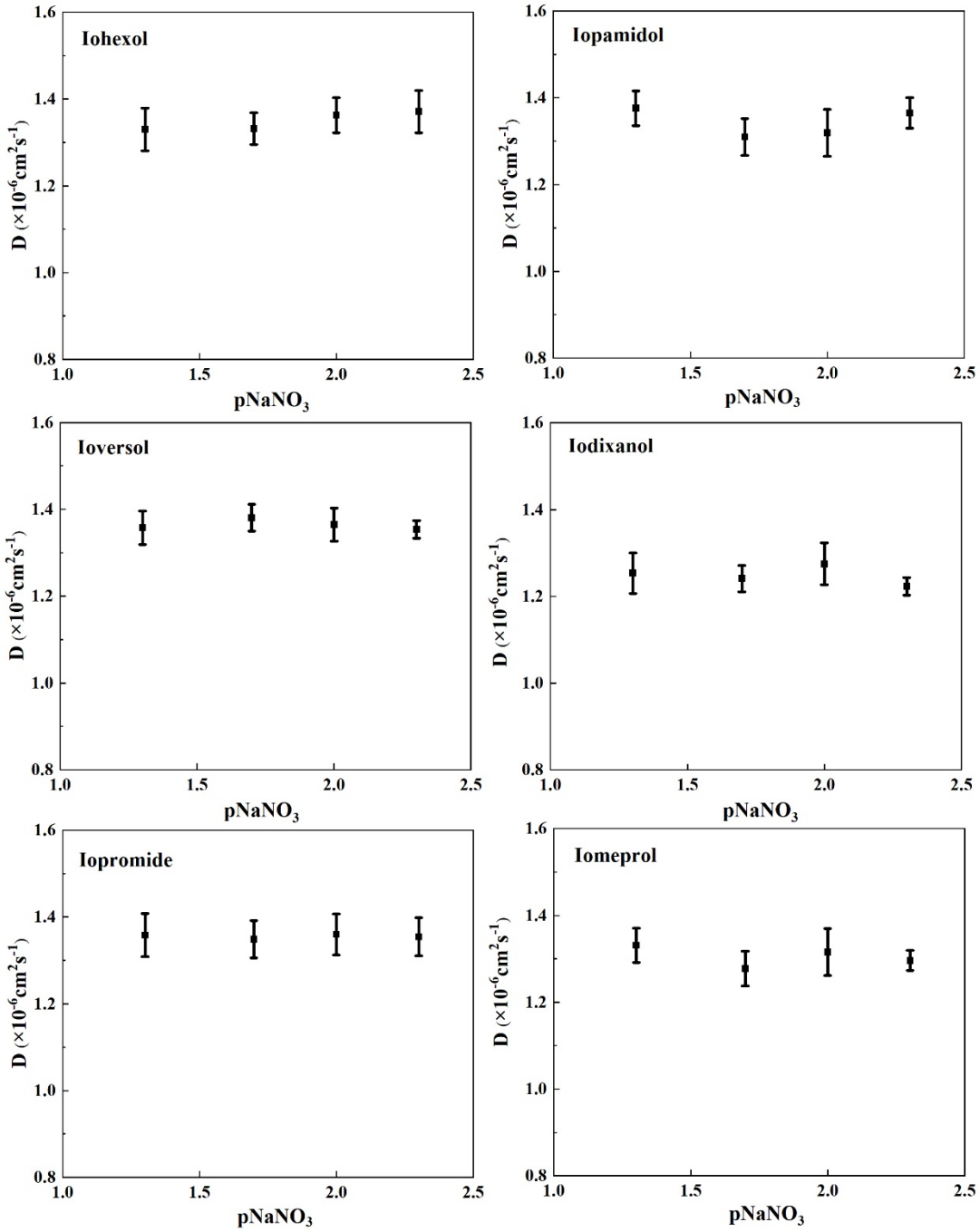

Figure S6 Effects of ionic strengths on diffusion coefficients of the six ICMs.

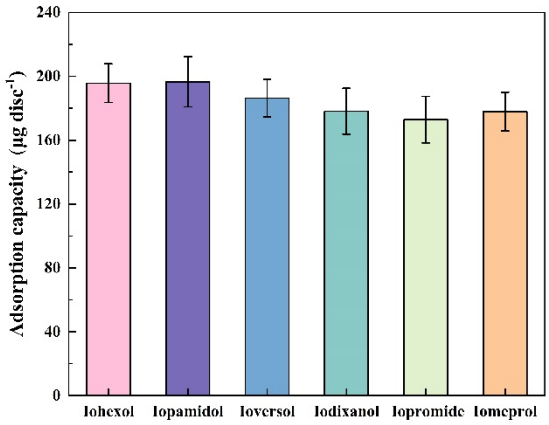

Figure S7 Competitive adsorption amounts of the G-gel for six ICMs.

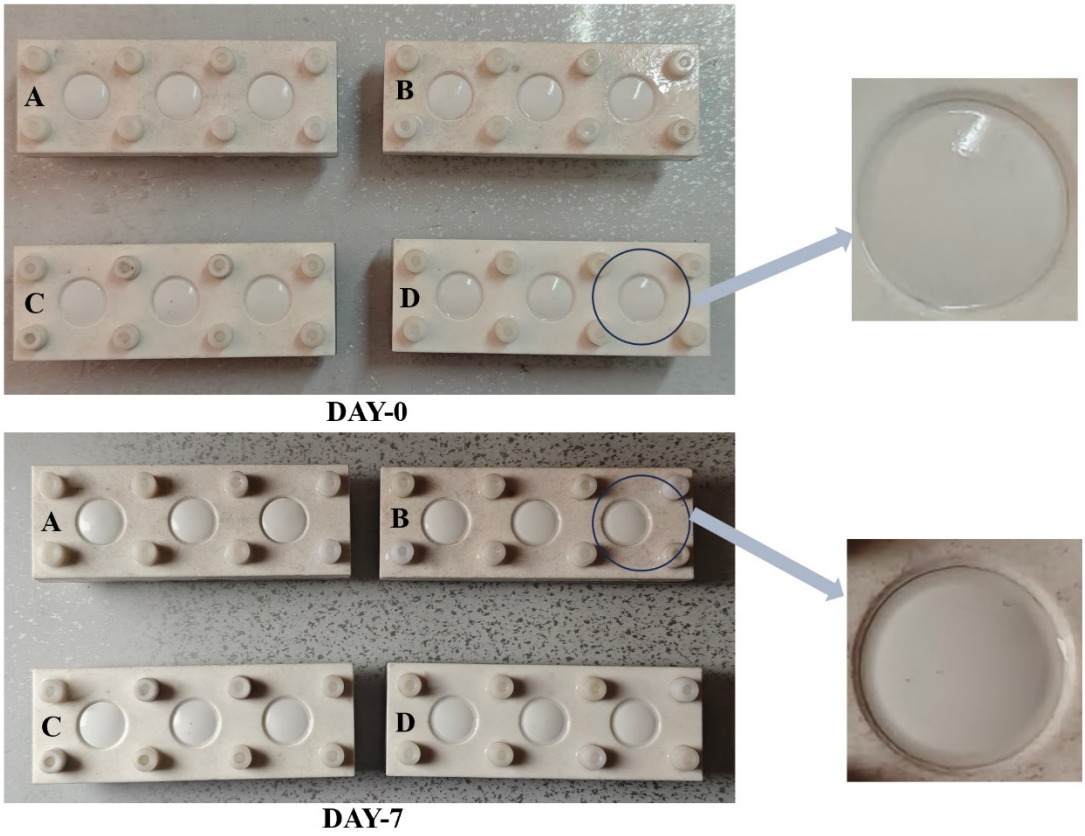

Figure S8 The appearance of the diffusive layer of the G-DGT before and after 7-day deployment