Supplementary Information (SI) for Journal of Materials Chemistry C.

*Supplementary Information**

*This version replaces the Supporting Information originally published on 01 July 2025 to correct errors in Tables S1 and S2. These corrections do not affect the conclusions reported in the article.

Superhydrophobic SiO_2/rGO Composite Coating with Enhanced Photothermal Properties for Anti-Icing/Deicing

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Content

Supplementary Figure legends

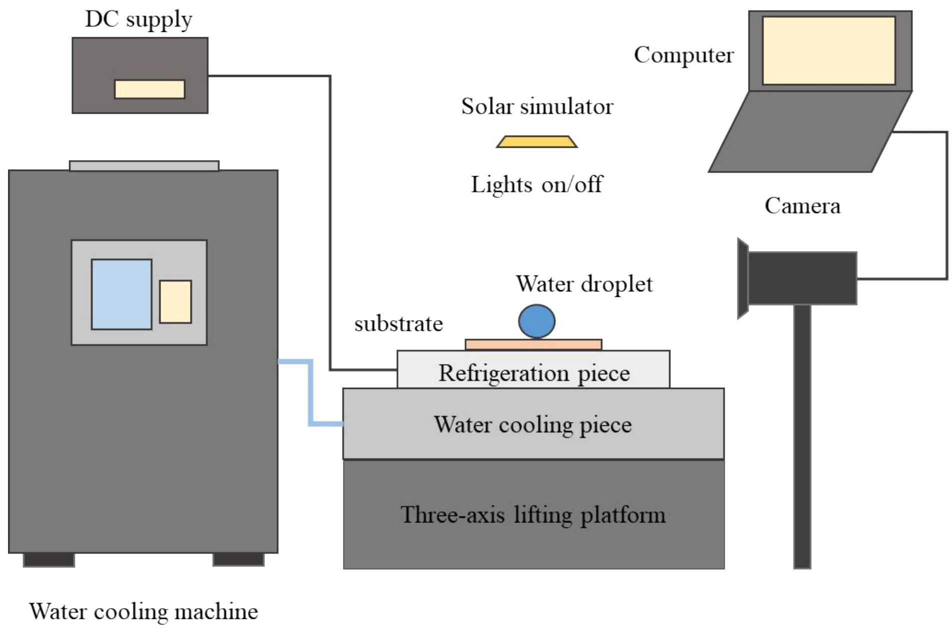

Fig.S1 Schematic diagram of the icing-delay test system.

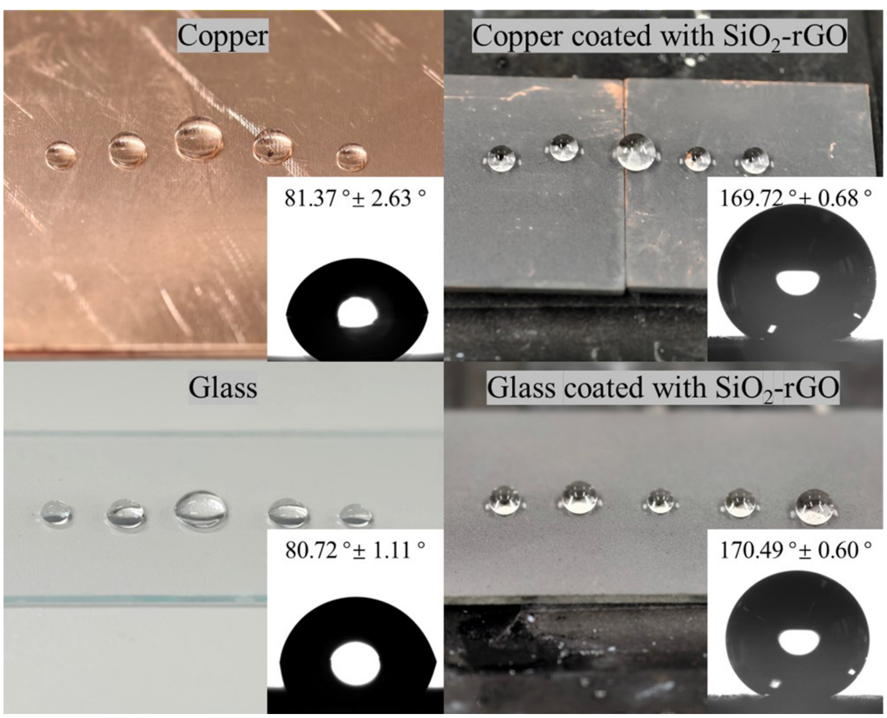

Fig.S2 Water contact angles (WCAs) of copper, copper coated with SiO_2/rGO, glass and glass coated with SiO_2/rGO.

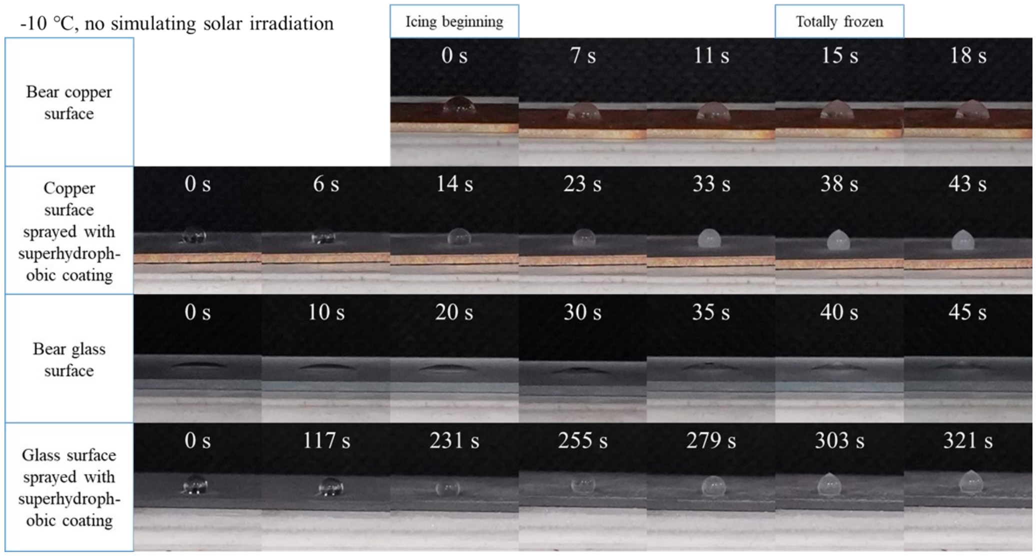

Fig.S3 The freezing time of four surfaces under the temperature of -10 ℃, relative huimidity of 40%, without illumination.

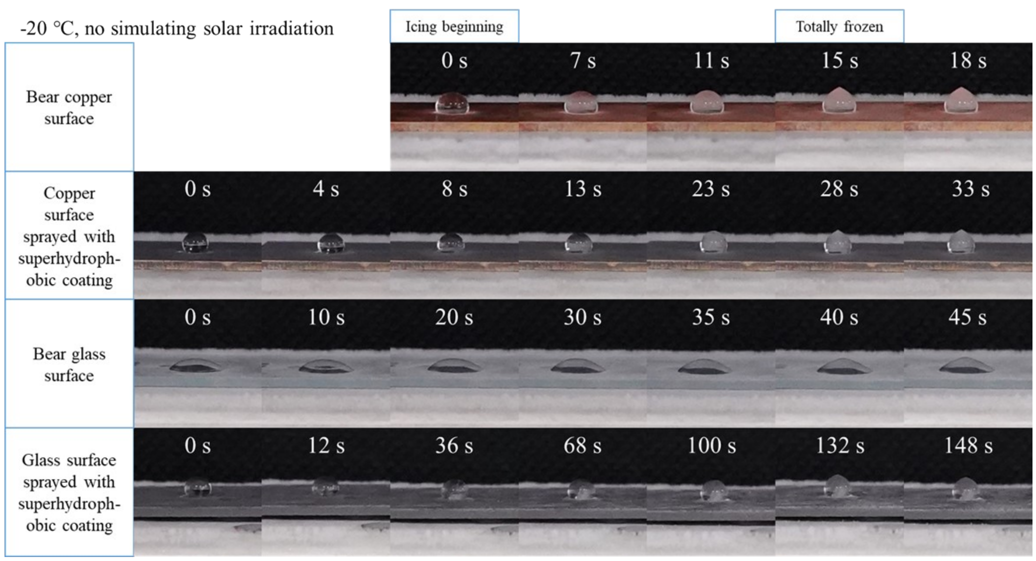

Fig.S4 The freezing time of four surfaces under the temperature of -20 ℃, relative huimidity of 40%, without illumination.

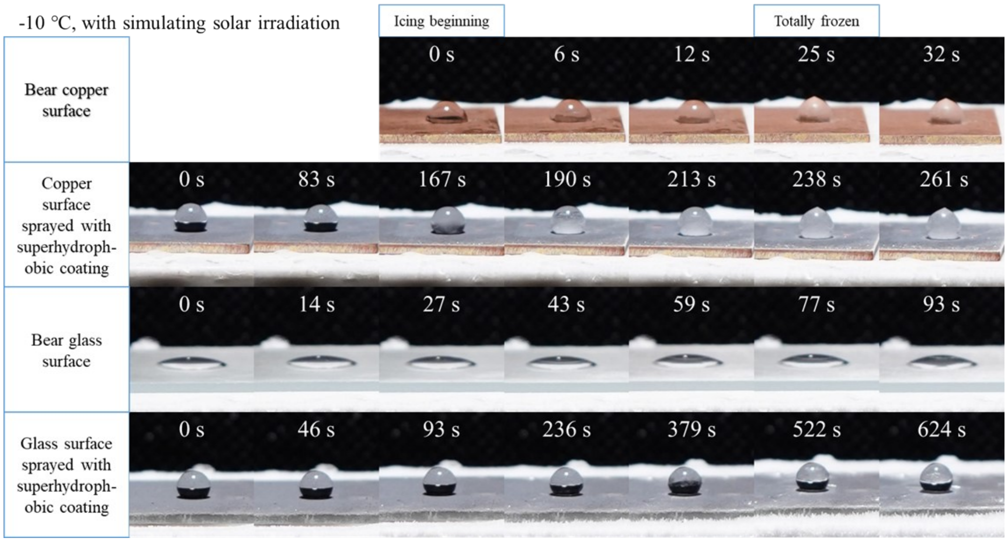

Fig.S5 The freezing time of four surfaces under the temperature of -10 ℃, relative huimidity of 40%, with illumination.

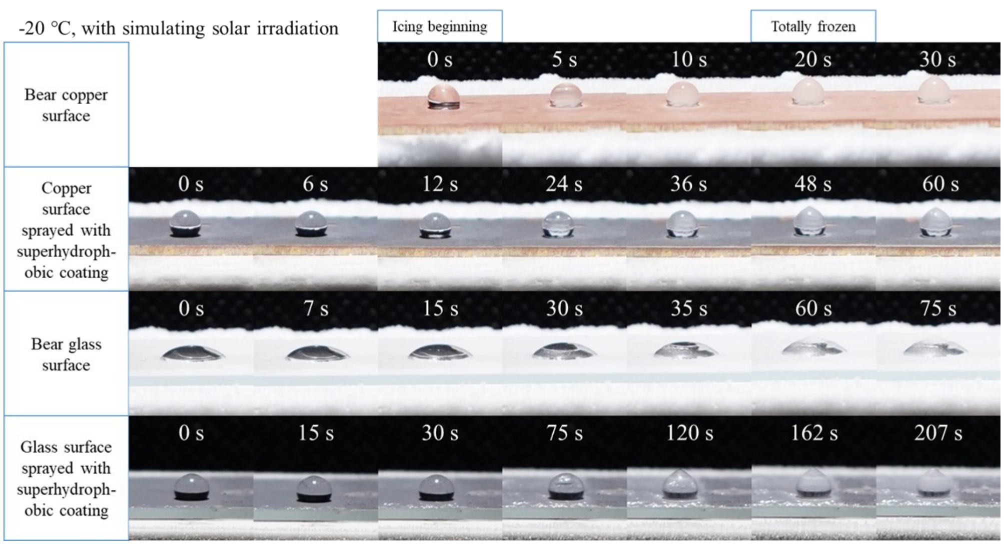

Fig.S6 The freezing time of four surfaces under the temperature of -20 ℃, relative huimidity of 40%, with illumination.

The as-prepared SiO_2/rGO composite coating was proven to have excellent photothermal conversion capability, which enabled it to perform deicing feasibility under low temperature and light (daytime) conditions. Hence, we investigated the photothermal deicing ability of the SiO_2/rGO composite coating. Fig. S7 shows the deicing processes of the coating on a glass substrate under 0.9 sunlight intensity illumination (relative humidity of 45%). IR and standard camera images in Fig. S7a indicate that the composite surface heats rapidly within 80 s, causing the ice to melt quickly. The remaining ice floated on the melted water, and at a slight incline (3°), the ice-water mixture rolled off from the surface due to its excellent superhydrophobicity. In contrast, the ice on the glass without coating completely melted after 460 s but remained on the surface. It was mainly due to the excellent light.

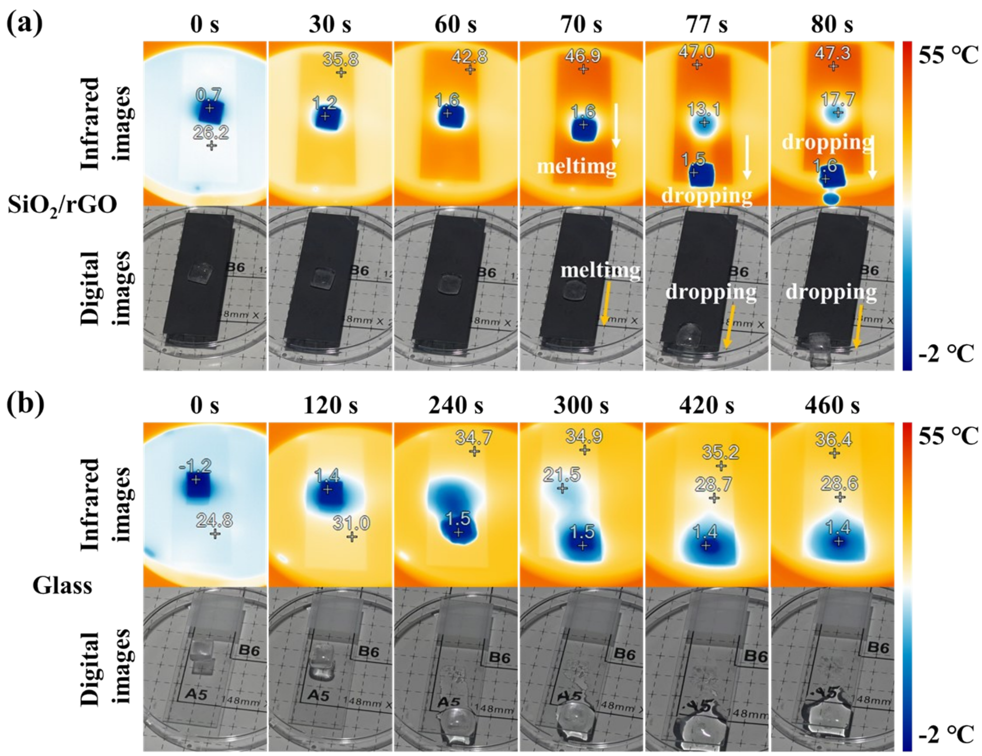

Fig. S7 Deicing performance of the (a) SiO_2/rGO composite coating and (b) glass surface under simulated sunlight (900 W/m²), with ice cube dimensions of 0.8 × 0.8 × 0.8 cm³ (0.512 mL).

Supplementary Tables

Table S1: The ratio of each material in the modification of SiO_2

VTES	SiO_2	Ammonium Hydroxide	DI Water	Ethanol
0.16 ml	40 mg	0.8 ml	8 ml	0.8 ml

Table S2: The ratio of each material in the modification of GO

KH550	GO	Ammonium Hydroxide	DI Water	Ethanol
0.48 ml	120 mg	2.4 ml	24 ml	2.4 ml

Table S3: The ratio of each material in the modification of SiO_2-rGO

FAS	DI Water	Ethanol
0.1 ml	2.5 ml	25 ml

Table S4: FTIR absorption peaks and corresponding functional groups

Absorption peak/cm^{-1}	Functional group
694 1409 2962	C-H
754	Si-C
808 1064	Si-O-Si
919 1032	Si-O-C
962 1277 1582 1603 3062	C=C
1044 3196~3593	C-OH
1150	C-F
1226	C-O-C
1716	C=O
2992 2916 2989	C-H
3683	-OH