nanomaterials

MDPI

Supplementary Information

Long-Term Performance of Nanomodified Coated Concrete Structures under Hostile Marine Climate Conditions

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Supplementary Information Tables

Table S1. Main components, description, and mixing ratio of the different resins.

Table S2. Density results, size, surface area values and average pore radius of the different nanoparticles.

Supplementary Information Figures

Figure S1. Coating methodology of concrete: spatula printing; paintbrush impregnation; paintroller impregnation and dip coating.

Figure S2. HRSEM micrographs (a) and contact angle measurements (b) of the selected nanoparticles.

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Figure S9. TGA profiles of the different NPs-S10-1 composites under nitrogen (a) and air (b) atmospheres before and after the weathering test.

Supplementary Information Tables

Table S1

	Principal Component	Description	Mixing ratio (wt.%)
SE	Bisphenol-A diglycidyl ether resin (60%)	Part A-resin	1 A: 2.4 B: 14 C
	Proprietary mixture of primary amines (100%)	Part B-hardener	
	Cement based	Part C-filler	
S	Bisphenol-A epichlorohydrin (75%)	Part A-resin	3 A: 1 B
	Amine-based components (45%)	Part B-hardener	
	Bisphenol-A diglycidyl ether resin (75%)	Part A-resin	3 A: 1 B
	Epoxy Amine Adduct (40%)/Benzyl alcohol (30%)	Part B-hardener	
M	Calcium dihydroxide (50%)/Ethyleneglycol (50%)	Part A-resin	1.5 A: 3.5 B
	Polymethylene polyphenyl polyisocyanate (90%)	Part B-hardener	
	Calcium dihydroxide (50%)/Ethyleneglycol (30%)	Part A-resin	2.2 A: 2.8 B
	Polymethylene polyphenyl polyisocyanate (80%)	Part B-hardener	

Table S2

	Density ($g \cdot cm^{-3}$)	Size (nm)	S_{BET} ($m^2 \cdot g^{-1}$)	Average pore radius (nm)
AC	1.1±0.0006	101.1	954.8	1.5
SMNC	1.7±0.0002	< 20 μm	11.8	11.9
SiO_2	2.7±0.0003	5-15	532.3	1.7
ZnO	6.1±0.0002	91.8	5.4	9.0

Supplementary Information Figures

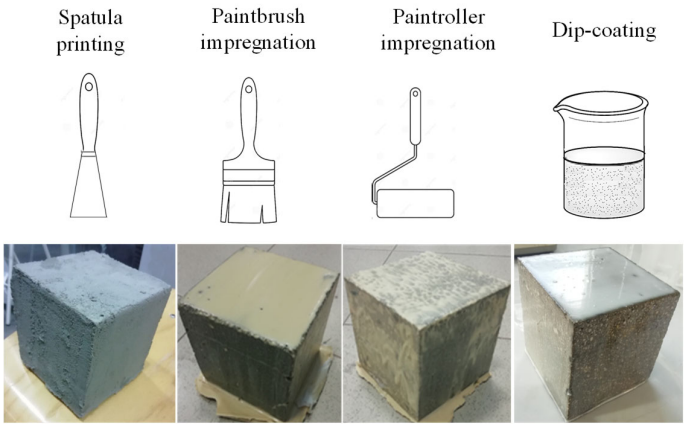


Figure S1.

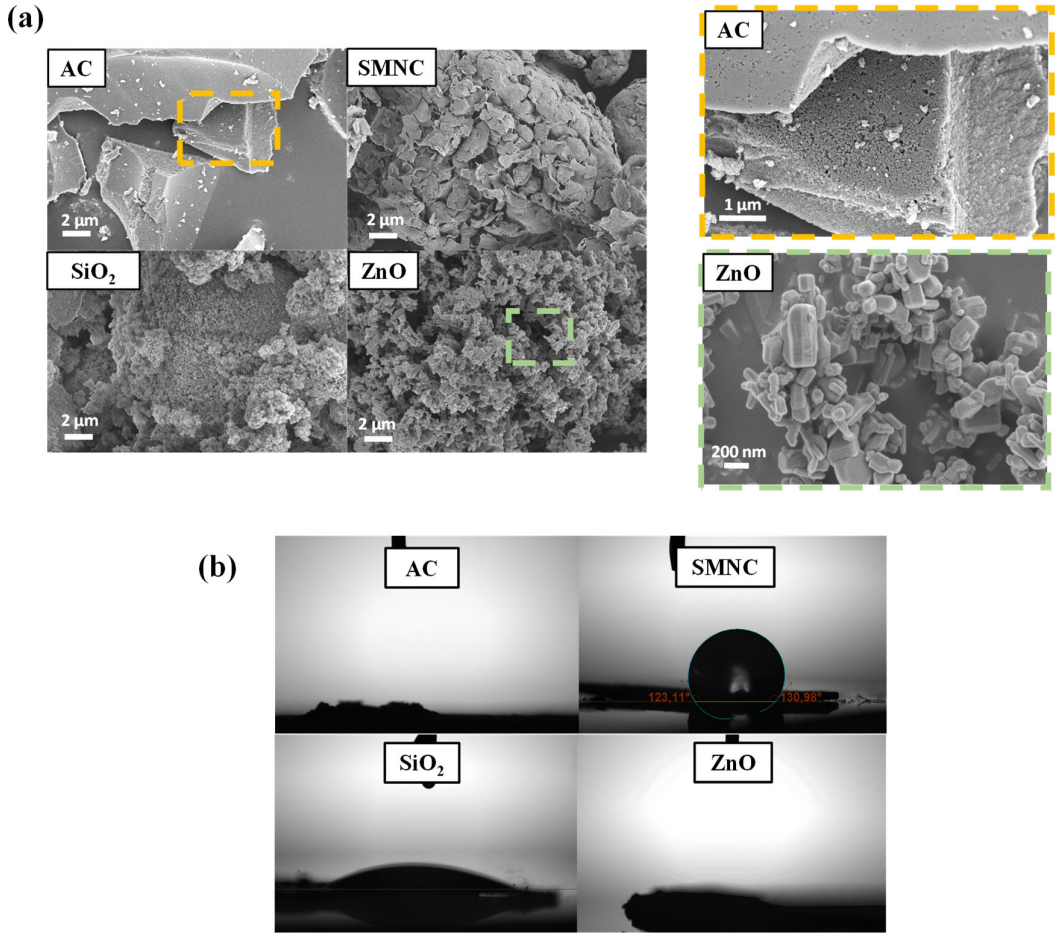


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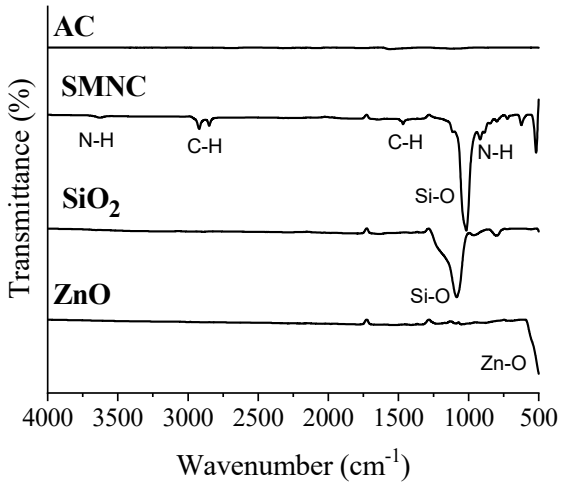


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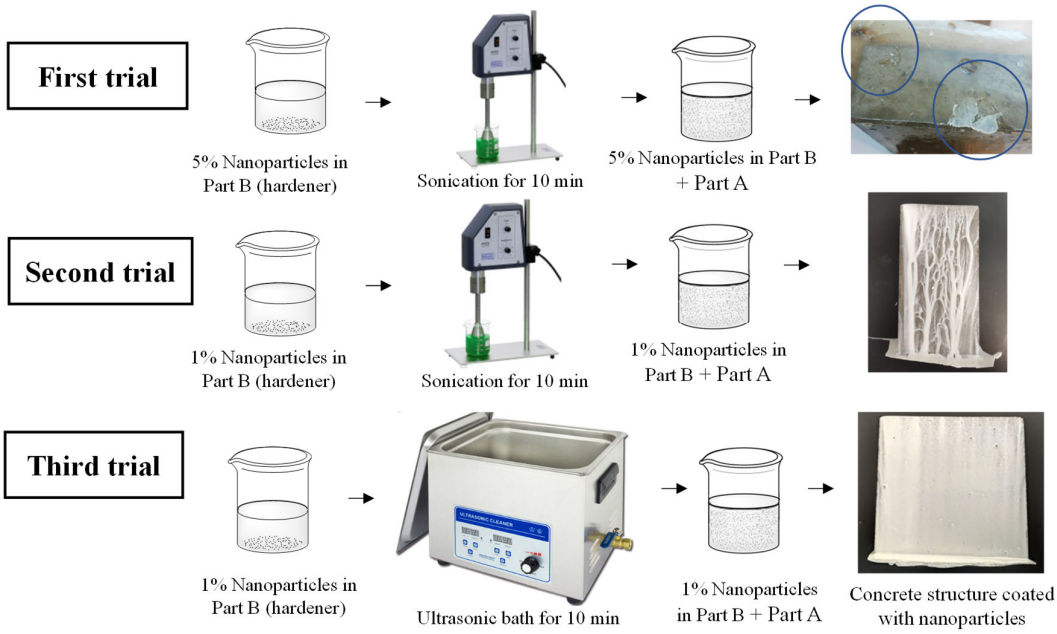


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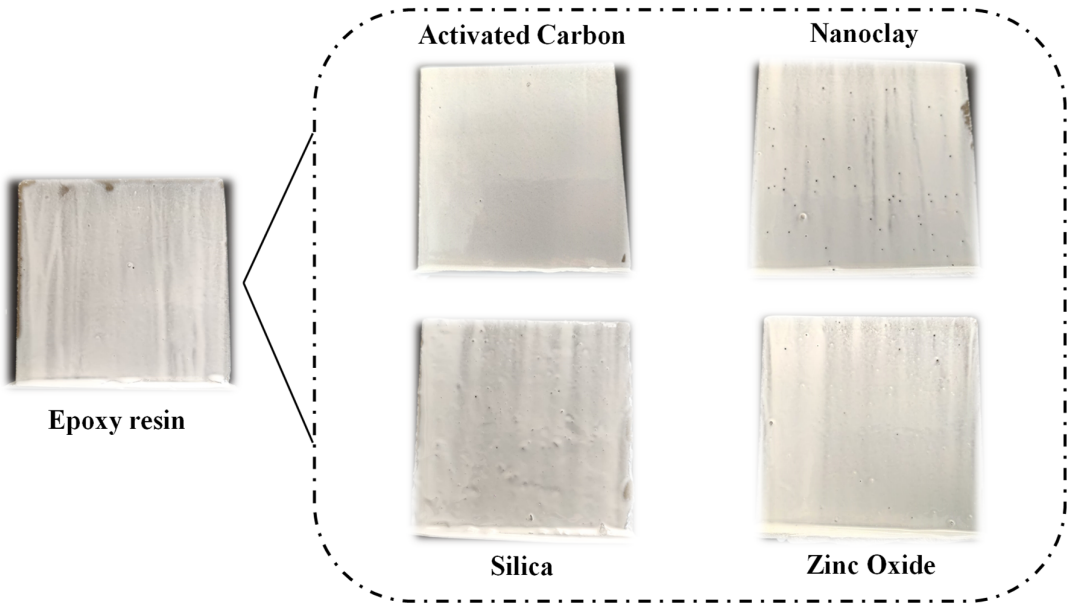


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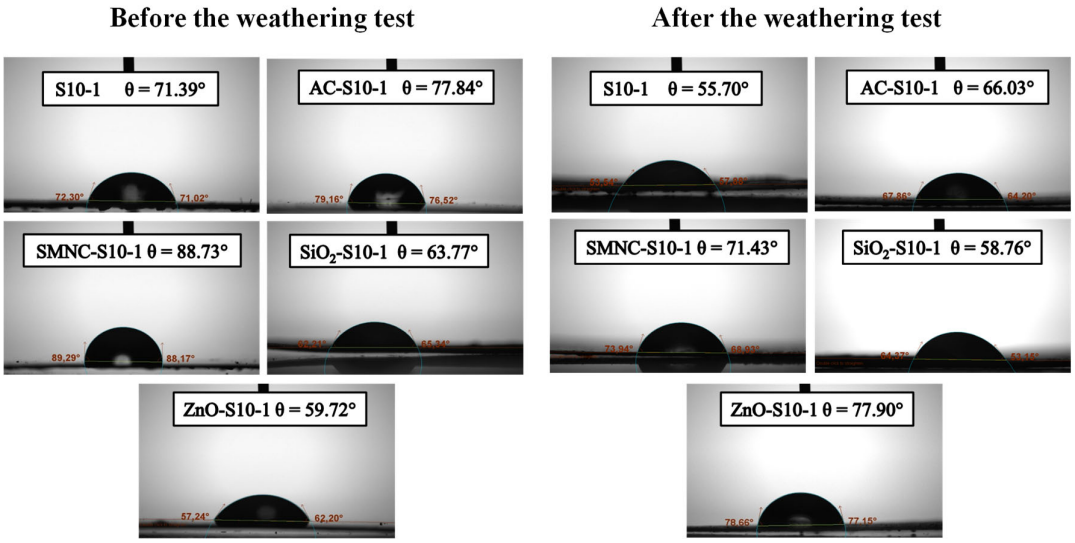


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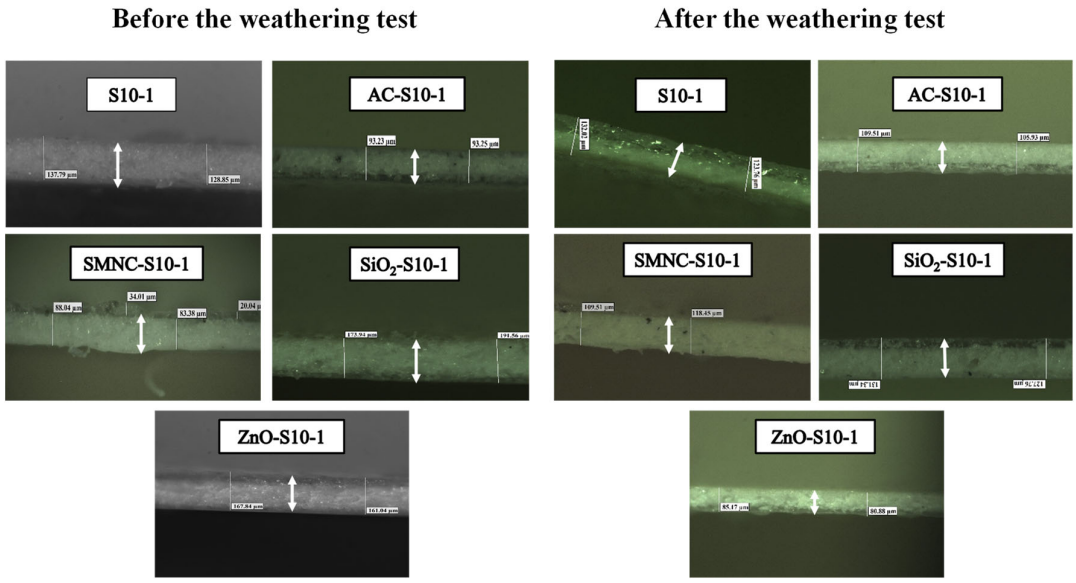


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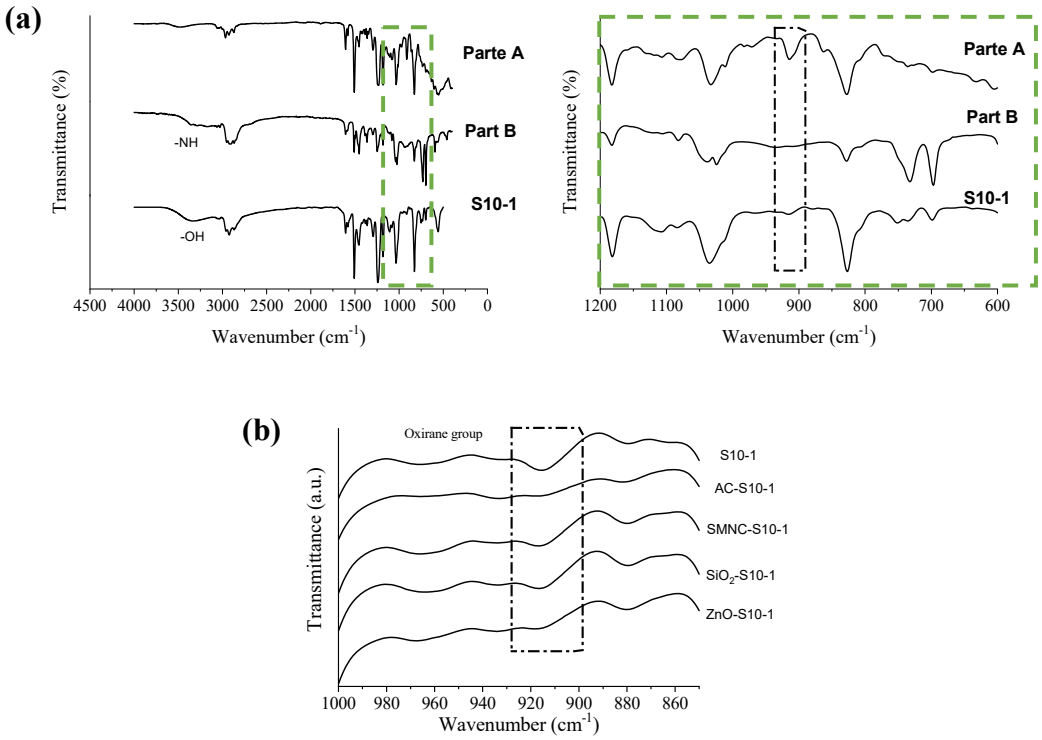

(a)
Transmittance (%)
Parte A
Part B
S10-1
-NH
-OH
4500 4000 3500 3000 2500 2000 1500 1000 500 0
Wavenumber (cm-1)
Transmittance (%)
Parte A
Part B
S10-1
1200 1100 1000 900 800 700 600
Wavenumber (cm-1)
(b)
Oxirane group
Transmittance (a.u.)
S10-1
AC-S10-1
SMNC-S10-1
SiO2-S10-1
ZnO-S10-1
1000 980 960 940 920 900 880 860
Wavenumber (cm-1)

Figure S8.

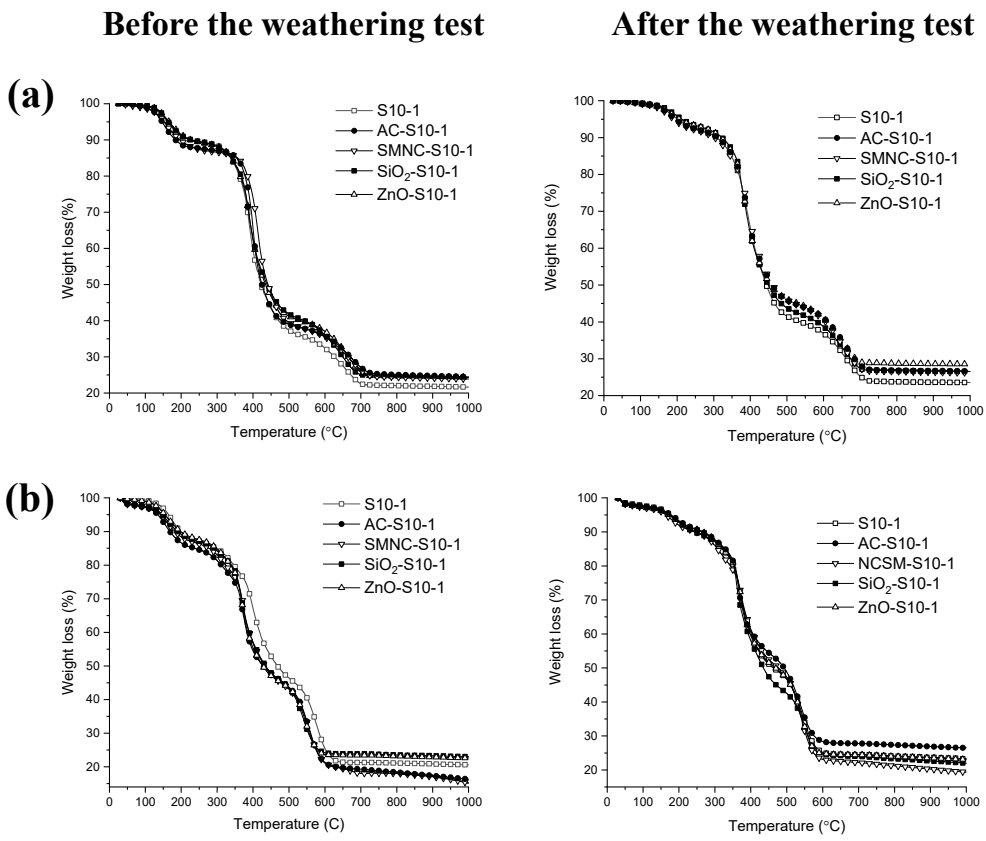

Before the weathering test
After the weathering test
(a)
(b)
Weight loss(%)
Weight loss (%)
Temperature (°C)
Temperature (C)
S10-1
AC-S10-1
SMNC-S10-1
NCSM-S10-1
SiO2-S10-1
ZnO-S10-1

Figure S9.