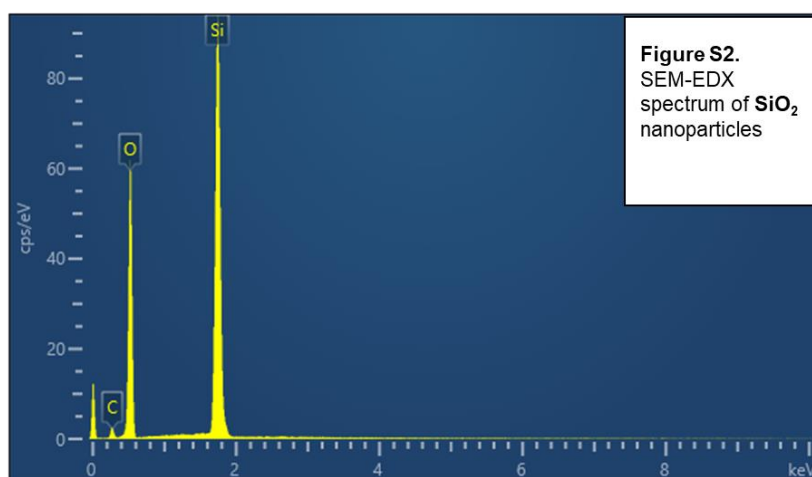
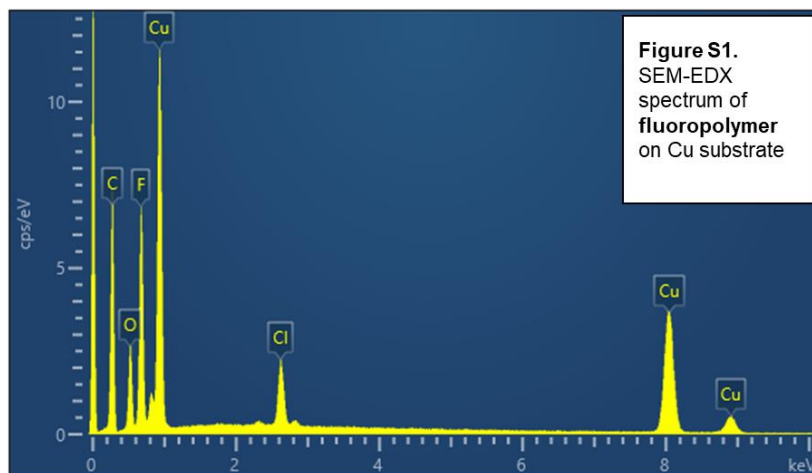


1. Material characterisation (SEM-EDX)

Fluoropolymer and SiO₂ NPS, used in the study, were deposited onto copper (Cu) plates, coated with gold (Au) and characterised using SEM-EDX. The results are shown in Figures S1 (fluoropolymer) and S2 (SiO₂). The identifications of carbon (C), fluorine (F), oxygen (O) and chlorine (Cl) in Figure S1 are attributed to the fluoropolymer molecule whereas Cu was originated from the substrate. Silicon (Si) and O were easily detected in the NPs, as expected (Figure S2). The small peak of C in Figure S2 can be attributed to contaminants.



2. Dispersions prepared in the study

Sixteen (16) coatings were produced and deposited on marble, by varying the polysiloxane/fluoropolymer mass ratio (Table 1) and the relative concentration of SiO₂ NPs. In particular, four sols were prepared which are summarized in Table 1 of the main manuscript and twelve dispersions were produced which are described in Table S1.

Table S1. Aqueous dispersions which were prepared and used in the study to treat marble.

Abbreviation	Sols & concentrations
6P/1Si	6% w/w Protectosil & 1% w/w SiO ₂
6P/1F/1Si	6% w/w Protectosil & 1% w/w Fluoropolymer & 1% w/w SiO ₂
6P/6F/1Si	6% w/w Protectosil & 6% w/w Fluoropolymer & 1% w/w SiO ₂
1P/6F/1Si	1% w/w Protectosil & 6% w/w Fluoropolymer & 1% w/w SiO ₂
6P/2Si	6% w/w Protectosil & 2% w/w SiO ₂
6P/1F/2Si	6% w/w Protectosil & 1% w/w Fluoropolymer & 2% w/w SiO ₂
6P/6F/2Si	6% w/w Protectosil & 6% w/w Fluoropolymer & 2% w/w SiO ₂
1P/6F/2Si	1% w/w Protectosil & 6% w/w Fluoropolymer & 2% w/w SiO ₂
6P/3Si	6% w/w Protectosil & 3% w/w SiO ₂
6P/1F/3Si	6% w/w Protectosil & 1% w/w Fluoropolymer & 3% w/w SiO ₂
6P/6F/3Si	6% w/w Protectosil & 6% w/w Fluoropolymer & 3% w/w SiO ₂
1P/6F/3Si	1% w/w Protectosil & 6% w/w Fluoropolymer & 3% w/w SiO ₂

3. Results of WCA and OCA measurements

The results of the WCA and OCA measurements which were carried out on the surfaces of the sixteen coatings on mabre are included in Table S2 and S3, respectively. The results shown below were used to construct Figures 2 and 4 of the main manuscript.

Table S2. Water contact angle (WCA) measurements.

Binder	Concentration of SiO ₂ nanoparticles			
	0 (no particles)	1% w/w	2% w/w	3% w/w
6P	131.0±2.6	151.4±1.0	148.8±3.0	147.8±3.0
6P/1F	130.7±1.2	153.8±1.6	158.0±2.5	152.0±0.5
6P/6F	131.6±6.1	151.0±0.7	159.5±1.3	151.0±0.5
1P/6F	128.9±5.5	152.2±1.7	159.0±2.7	152.1±3.0

Table S3. Oil contact angle (OCA) measurements.

Binder	Concentration of SiO ₂ nanoparticles			
	0 (no particles)	1% w/w	2% w/w	3% w/w
6P	103.0±3.5	139.5±2.8	123.2±0.5	61.2±3.5
6P/1F	103.4±5.7	145.2±1.3	152.2±0.7	147.5±2.0
6P/6F	103.3±5.5	145.6±1.7	152.4±0.7	149.0±1.7
1P/6F	107.5±3.2	145.6±0.8	152.8±0.7	148.4±1.8

4. The self-cleaning scenario on marble coated with 6P/1F/2Si

In order to demonstrate the self-cleaning scenario on the 6P/1F/2Si surface, small particles were deliberately placed on the coated marble specimen. The particles were easily removed by water drops which rolled off the tilting surface, as shown in Figure S3.

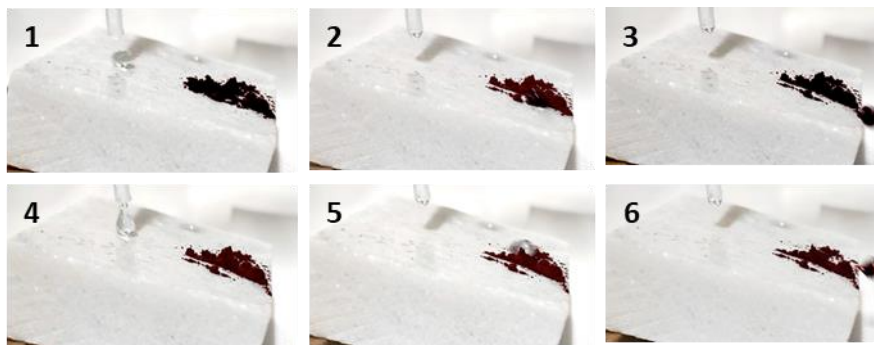


Figure S3. The self-cleaning scenario on the 6P/1F/2Si surface is revealed in the subsequent snapshots (1-6).