Supplementary Information

Fabrication of a Waterborne, Superhydrophobic, Self-Cleaning, Highly Transparent and Stable Surface

Tinghan Yang†a, Meng Wang†a, Xin Wanga, Xin Di, Chengyu Wang*,a Yudong Li*a

† Key Laboratory of Bio-based Material Science & Technology (Northeast Forestry University), Ministry of Education, Harbin 150040, China
† These authors contributed equally to this work and share the first authorship.
*Corresponding author. Email address: wangcy@nefu.edu.cn (Chengyu Wang), Email address: lydlnn0000@163.com (Yudong Li)
1. Detail Characterizations

Scanning Electron Microscopy (HITACHITM3030) was performed to representation surface morphology the surface morphologies of the superhydrophobic coatings and solar thermal pigment were observed with scanning electron microscopy at an acceleration voltage of 5.0 kV. An energy-dispersive spectrometer (BRUKER QUANTAX 70) attached to the SEM instrument was used to analyze element compositions of the transparent superhydrophobic surface. The total specific surface area was calculated according to Brunauer-Emmett-Teller (BET) (JW-BK132F, Beijing) model while the pore diameter distribution was calculated by applying Barrett-Joyner-Halenda (BJH) method to the N\textsubscript{2} desorption data. The X-ray photoelectron spectroscopy (XPS, ESCALAB 250Xi) was used to analyzed the chemical components of the surface. The Atomic force microscopy (AFM, Bruker Dimension ICON) was used to analyzed the surface roughness. The transmittance and reflection spectra of this surface on glass slides in visible light were performed using a Transmittance analyzer (HitachiU-4100).
2. Results and discussion

Fig. S1 (a) The pore size of decorated hydrophobic SiO$_2$ nanoparticles. (b) The desorption and adsorption image of decorated hydrophobic SiO$_2$. 
Fig. S2 Comparison of infrared spectra between modified silica nanoparticles and original silica nanoparticles
Fig.S3 Schedule of sandpaper abrasion test
Fig. S4 AFM image of different spray layers: (a) 120 layers, (b) 160 layers, (c) 200 layers

Table S1. The thickness corresponding to different spraying layers

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Fig. S5 Trend of surface contact angle (CA) and sliding angle (SA) under different test conditions: (a) CAs and SAs on the surface after treatment in the pH range of 2-12. (b) CAs and SAs of the surface after treatment at 20-200 °C for 2 h. (c) CAs and SAs of the surface after treatment at 150 °C and heating for 2-24 h. (d) CAs and SAs on the surface after treatment by 150-grit sandpaper and abrasion with 50 g weight load.
Fig. S6 (a) Uncontaminated surface, (b) muddy water just started to drip on the surface, (c) muddy water rolled off the surface without adhesion, (d) surface was not contaminated
Fig. S7 (a) Uncontaminated surface, (b) surface contaminated with oil (hexane), (c) dropped water on oil-contaminated surface, (d) the oil on the surface was removed.