

Electronic Supplementary Information (ESI)

Facile strategy for fabrication of transparent superhydrophobic coatings on the surface of paper

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Experimental details

Preparation of hexadecyltrimethoxysilane-modified silica nanoparticles

Five grams of silica nanoparticles with diameter of 50-100 nm were dispersed in 50 mL of dehydrated toluene. After the addition of 2.5 g of hexadecyltrimethoxysilane, the mixture was refluxed for 5 h under a dry nitrogen flow. After centrifugation, the obtained modified silica was dispersed in anhydrous ethanol again, and washed with anhydrous ethanol twice. The product was dried at room temperature under reduced pressure.

Dip-coating process

All prepared samples are shown in Table S1. For example, modified silica particles (0.5 g) were dispersed in 9.5 g of anhydrous ethanol under ultrasonication, resulting in a sample with a modified silica concentration of 5.0 wt % in ethanol. The printed papers as well as color photographs were coated with modified silica nanoparticles by dip-coating method. The papers were inserted and immersed in the solution for no more than 5 s. The resulting samples were placed horizontally, and dried at room temperature overnight to allow ethanol to evaporate from the films.

Following the aforementioned procedure, the glass slide coatings were prepared by a similar method.

Characterization

The films were analyzed using a JSM-6510LV scanning electron

microscope (SEM) for morphological observations. The wetting properties of the as-prepared modified silica nanoparticle coated papers were performed using an OCA40 contact angle goniometer (Dataphysics, Germany) and the values reported were the average of three drops for each sample at different locations. UV-vis spectra were recorded on a TU-1901 Double-beam UV-Vis spectrophotometer (Beijing Persee Co., Ltd.). The glass slide sample was placed perpendicularly to the beam to maintain the same positioning during each measurement.

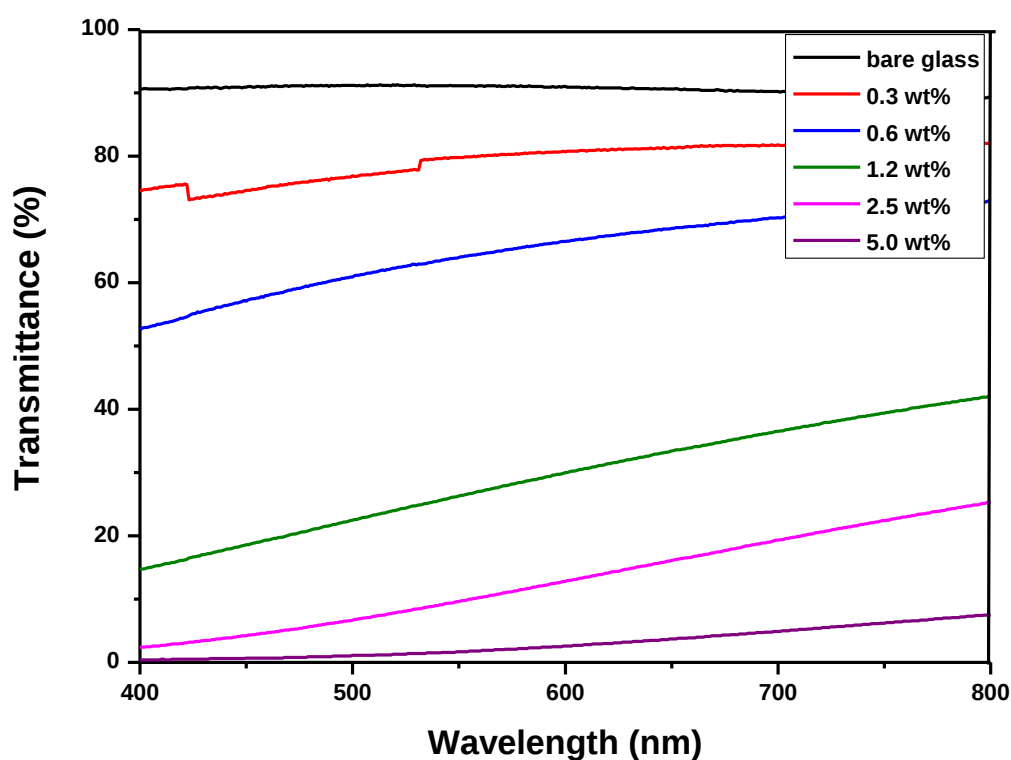
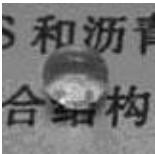
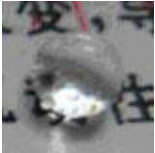
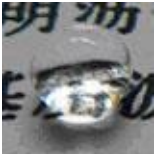


Fig. S1. Transmittance of bare glass and modified silica coated glass with varied concentrations.

Table S1. Samples of modified silica/ethanol with different concentration, contact angles of silica nanoparticle coatings on paper substrates, and droplet images on the surface of printed papers.

Sample	Concentration of modified silica in ethanol (wt %)	Water contact angle (degree)	Droplet image
1	5.0	142 ± 2.1	
2	2.5	147 ± 1.0	
3	1.2	149 ± 1.6	
4	0.6	153 ± 0.8	
5	0.3	145 ± 1.0	-