One-step Coating of Fluoro-containing Silica Nanoparticles for Universal Generation of Surface Superhydrophobicity

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\textbf{ELECTRONIC SUPPLEMENTARY INFORMATION}

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**Experimental Section**

Ethanol, tetraethyloorthosilicate (TEOS), and ammonium hydroxide (28% in water) were obtained from Aldrich. Tridecafluorooctyl triethoxysilane (FAS, Dynasylan F 8261) was supplied by Degussa.

Electron microscopic images and EDX mapping were taken on a scanning electron microscope (SEM) Leo 1530 and JSM-5910, respectively. Transmission electron microscope (TEM, JEM-200 CX JEOL) was used to observe the silica particles. FTIR (Fourier Transform Infrared) spectra were measured on a FTIR spectrophotometer (Bruker Optics) in ATR mode. Water contact angles were measured using a contact angle meter (KSV CAM200 Instruments Ltd). X-ray photoelectron spectra (XPS) were collected on a VG ESCALAB 220-iXL spectrometer with a monochromated Al K\(\alpha\) source (1486.6 eV) using samples of ca. 3 mm\(^2\) in size. The X-ray beam incidence angle is 0\(^\circ\) with respect to the surface normal, which corresponds to a sampling depth of ca. 10 nm. The obtained XPS spectra were analysed by the XPSPEAK41 software.

Typical sol preparation and coating procedure: TEOS (5ml), together with an appropriate amount of FAS, was dissolved in 25 ml ethanol. The solution was mixed with ammonium hydroxide/ethanol solution (6ml 28% NH\(_2\)H\(_2\)O in 25 ml ethanol), and stirred intensively at room temperature for 12 hr. The milky mixture solution was then ultrasonicated (VCX750 Sonics & Materials Inc.) for 30 min to produce a homogeneous suspension prior to the coating onto substrates. Upon drying at room temperature, the treated substrate was further cured at 110\(^\circ\)C for 1hr.

A large variety of different substrates: glass slide, polyester fabric (plain weave, 168 g/m\(^2\)), wool fabric (plain weave, 196 g/m\(^2\)), cotton fabric (plain weave, 160 g/m\(^2\)), electrospun polyacrylonitrile (PAN) nanofibre mat (average fibre diameter 226 \(\pm\) 21 nm, thickness 0.29 \(\pm\) 0.03 mm), filter paper (Advantec. Tokyo Roshi Kaisha, Ltd), and silicon wafer (Si-Mat Silicon Materials) were used in the present work.
**Fig. S1.** Typical TEM images for the particles and the particle-coated polyester fabric
Fig. S2. FTIR spectra of polyester fabric before and after the silica coating (FAS/TEOS=1:10 mol/mol)
Fig. S3. XPS survey spectra of the polyester fabric before and after the superhydrophobic treatment (FAS/TEOS=1:10 mol/mol)
Fig. S4. The effect of FAS/TEOS ratios and treatment times on the water contact angles of the silica-coated polyester fabric.