Supplementary Material (ESI) for Chemical Communications

Self-Assembled Perpendicular Growth of Organic Nanoneedles via Simple Vapor-Phase Deposition: One-Step Fabrication of a Superhydrophobic Surface

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ELECTRONIC SUPPLEMENTARY INFORMATION

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Experimental Section

The needle-shaped nanostructured films were deposited on precleaned glass slide, Si substrates, PMMA coated-Si, CYTOP coated-Si using a bell jar type thermal evaporator (VTS Co.) under a working pressure of 1×10^{-6} torr. Evaporation rates were kept constant by using the STM-100/MF thickness/rate monitor from Sycon Instruments. Since the distance between the thermal source and substrate (TS distance) was 15 cm, thick films were able to be deposited with reduced loss of the source.

The poly(methyl methacrylate)(PMMA) coated Si substrates was spin-coated form a filtered solution (3.0 wt%) of PMMA (Aldrich, MW=120,000) in dichlorobenzene, and then evaporation of the residual solvent provided dried polymer film coating on the silicon substrate.

The perfluoropolymer coated silicon substrate was also prepared same process. The CYTOP® CTL-809M (solvent: CT-Solv.180) from Asahi Glass, Japan was spin-casted onto the silicon substrate and dried for 30min at 180^{o}C.

SEM images of the physical vapor deposited films and the drop-cast films were obtained using a JSM-6330F (JEOL) FE-SEM, after sputter deposition of a thin conductive platinum coating onto the films.

The contact Angles were measured using a Poenix 300 contact angle analyzer (Surface Electro Optics Co, Ltd.) with image XP software. Static contact angle measurements were carried out 60 s after the droplet was deposited on the surface.

Image of fluorescence from the superhydrophobic surface:

The superhydrophobic surface prepared by self-assembly of CN-TFMBE shows remarkable fluorescence emission in the coated film, which is attributed to the aggregation-induced enhanced emission phenomenon (AIEE).

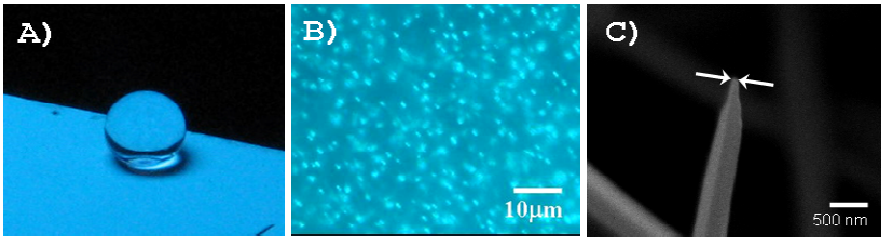

Figure S1. A) Photograph of the fluorescent superhydrophobic surface and a water droplet placed on the surface. The surface was excited by a 365 nm hand-held UV lamp (1.2 $mW \cdot cm^{-2}$). B) A fluorescence image of the nanostructured surface obtained by optical microscopy. C) SEM image of pine-needle-shaped (60-70nm) CN-TFMBE (a tilt view of the surface is shown)

SEM image of cross section:

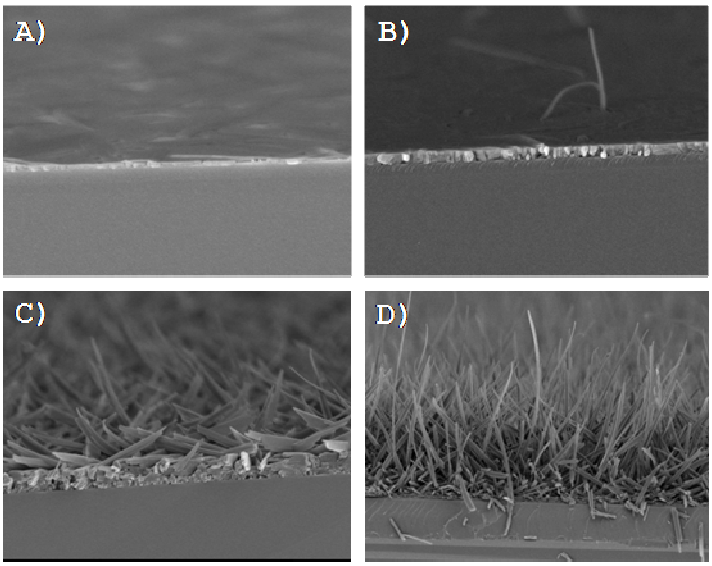

Figure S2. SEM images of vapor-deposited CN-TFMBE surfaces (cross-sectional view) on silicon substrates for various film thickness: A) 50nm, B) 500nm, C) 1.9 μm, D) 8.0 μm.

Surface effect by different surface:

CN-TFMBE coated-surface prepared by PVD method on different surface show the same contact angle and same morphology due to vertical nanoneedle coated surface.

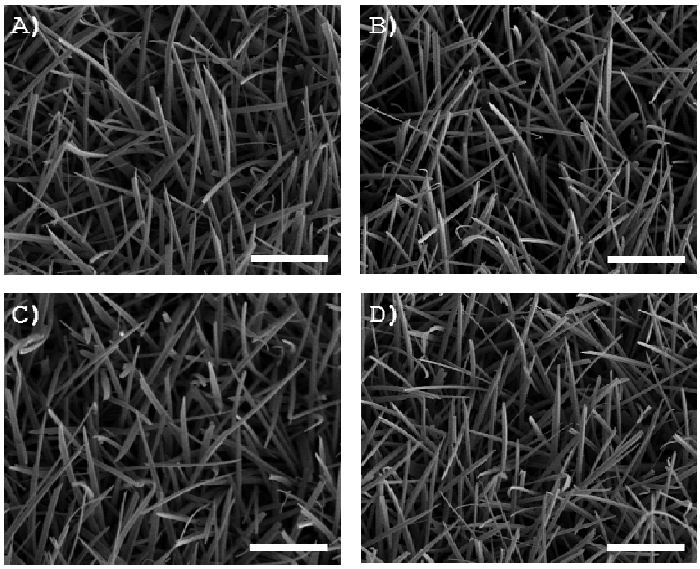

Figure S3. SEM images (tilt view) of vapor-deposited CN-TFMBE surfaces on various substrates: A) glass slide, B) silicon substrate, C) poly(methyl methacrylate) film on silicon substrate, D) perfluoropolymer film on silicon substrate, respectively. (scale bar is 10μm)