

Supporting Information

A rapid and efficient strategy for preparation of super-hydrophobic surface with cross-linked cyclotriphosphazene/6F-bisphenol A copolymer microspheres

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Experimental Materials

Hexachlorocyclotriphosphazene (HCCP) (synthesized as described in the literature¹) was recrystallized from dry hexane followed by sublimation (60 °C, 0.05 mmHg) twice before use. The melting point of the purified HCCP was 113-114 °C. 4,4'-(hexafluoroisopropylidene)diphenol (BPAF) (purity > 99.5 %), acetonitrile, ethanol, acetone and triethylamine (TEA) were purchased from Shanghai Chemical Reagents Corp. (Shanghai, China) and used without further purification.

Characterization

The field-emission scanning electron microscopy (FE-SEM) images were taken using a JEOL JSM-7401F scanning electron microscope at an activation voltage of 5 kV. The sample (clean silicon wafer dip-coated with PZAF microspheres) was coated with gold before imaging. The Fourier-transform infrared (FT-IR) measurements were conducted on a Perkin-Elmer Paragon 1000 Fourier-transform spectrometer at room

temperature (25 °C). The samples (HCCP, BPAF and PZAF microspheres) were mixed with KBr pellets to press into the small flakes and scanned over a range of 450-4000 cm^{-1} . Thermogravimetric analyses (TGA) were performed on a Perkin Elmer TGA 7/DX thermogravimetric analyzer (TA instruments) in the temperature range from ambient temperature to 800 °C at a heating rate of 20 °C/min under nitrogen atmosphere at a flow rate of 100 mL/min. The thermal degradation temperature was taken as the onset temperature at which 5 wt % of weight loss occurs. The water contact angles (CA) were measured on a Dataphysics OCA20 contact-angle system at ambient temperature. Water droplets (about 4.0 μL) were dropped carefully onto the coating surface and the native PZAF with a smooth surface (both have six samples to be measured). The contact angle value of per sample was obtained by measuring five different positions of the same sample and averaging them, which was then averaged with other five samples' values to lead to the final contact angle value. The standard deviation values were also calculated. The X-ray photoelectron spectroscopy (XPS) was carried out on the PZAF microspheres pressed into pellets by using a PHI Quantum 2000 Scanning ESCA Microprobe instrument with a monochromatic Al $\text{K}\alpha$ X-ray source (1486.60 eV).

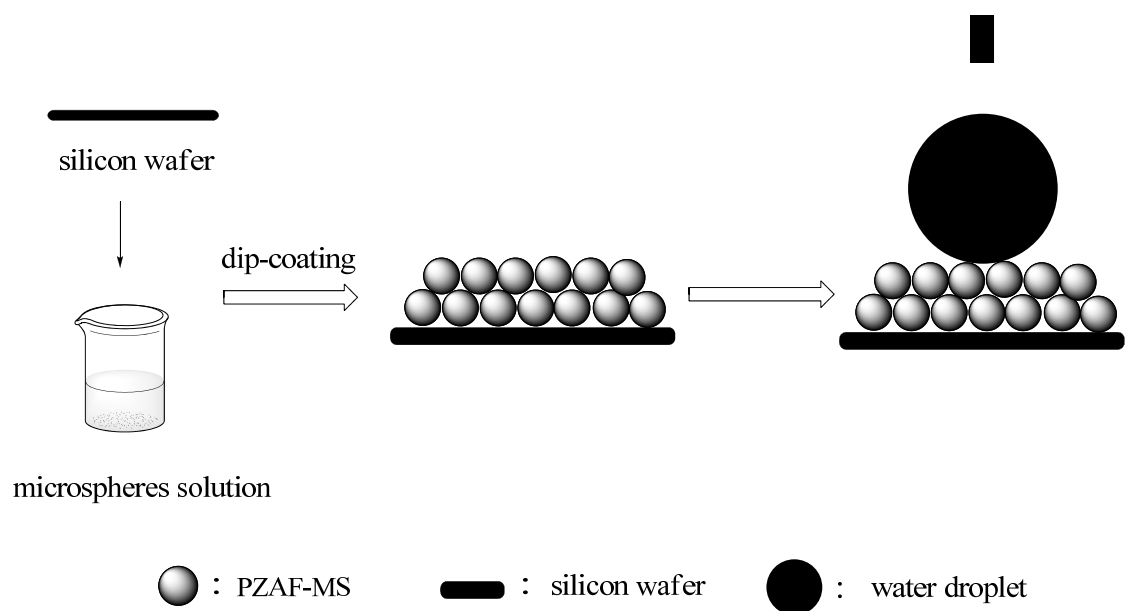


Fig. S1 Scheme of creating a super-hydrophobic surface via the dip-coating of PZAF microspheres onto the substrate.

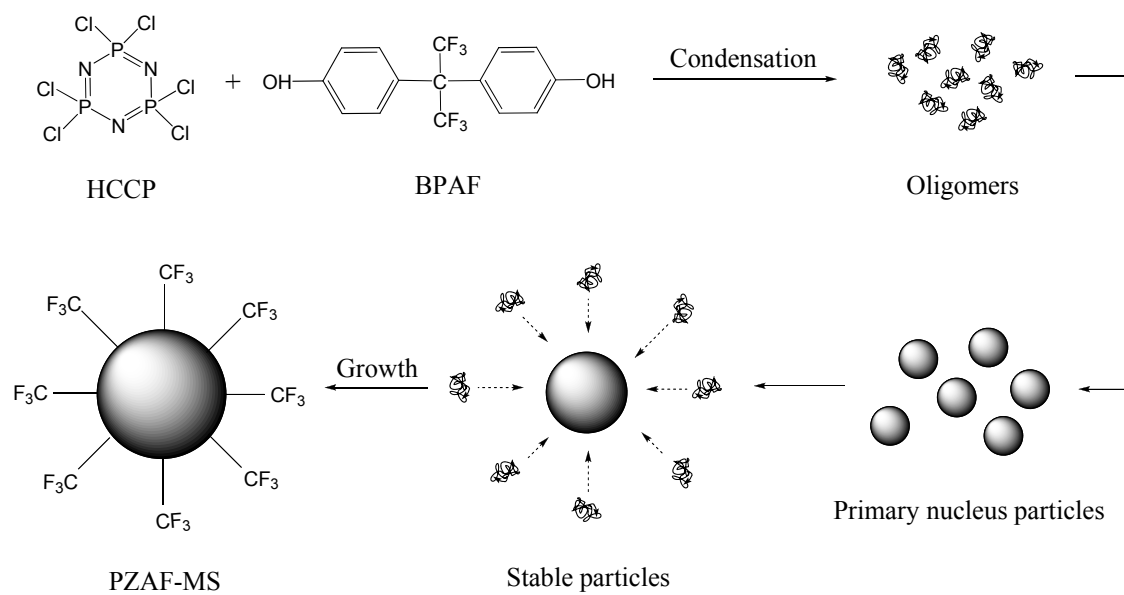


Fig. S2 Possible mechanism for the formation process of PZAF microspheres bearing $-\text{CF}_3$ groups.

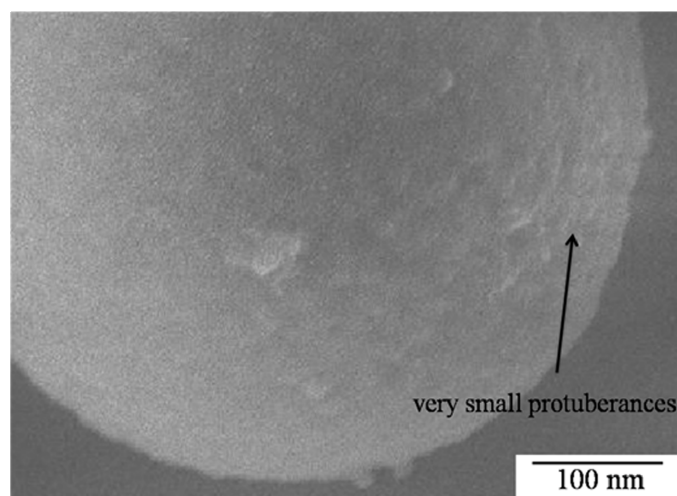


Fig. S3 FE-SEM image of the PZAF microsphere surface with larger magnification.

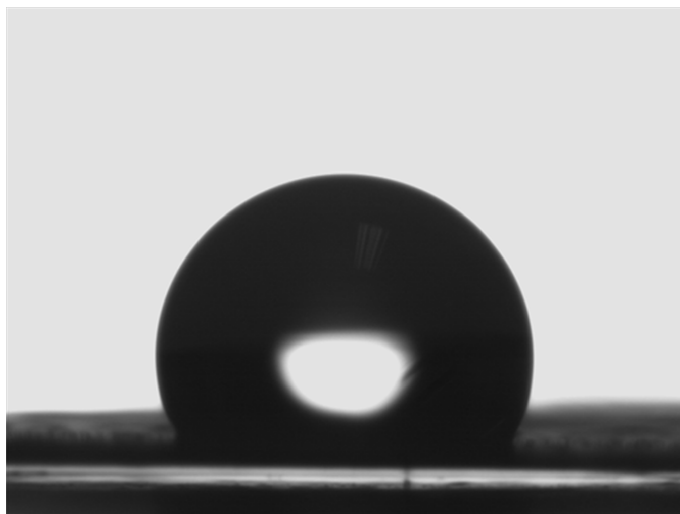


Fig. S4 The shape of a water droplet on the native PZAF with a smooth surface.

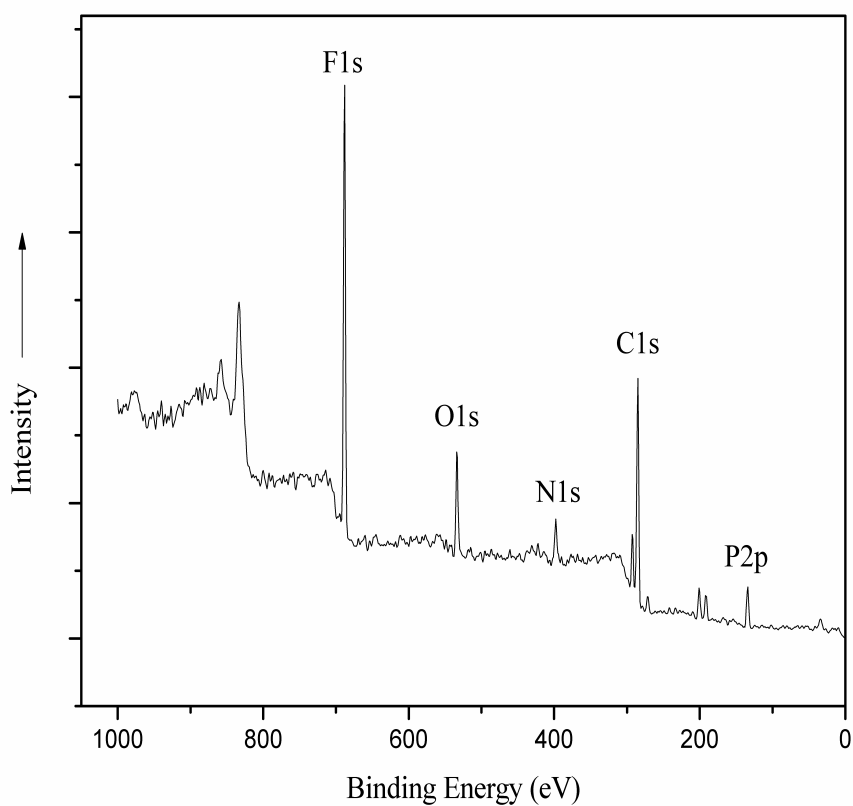


Fig. S5 XPS spectra of the PZAF microsphere surface.

Table S1 Atomic concentrations of the PZAF microsphere surface.

	F%	C%	O%	P%	N%
Calculated from the chemical structure	24	60	8	4	4
The results of XPS	25.86	56.33	8.16	4.44	5.21

Supplementary Material (ESI) for Chemical Communications
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References

1. R. D. Jaeger, M. Gleria, *Prog. Polym. Sci.*, 1998, **23**, 179.