ADVANCED MATERIALS

Supporting Information

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Conventional curing process for fabricating a stable bionic superhydrophobic coating surface

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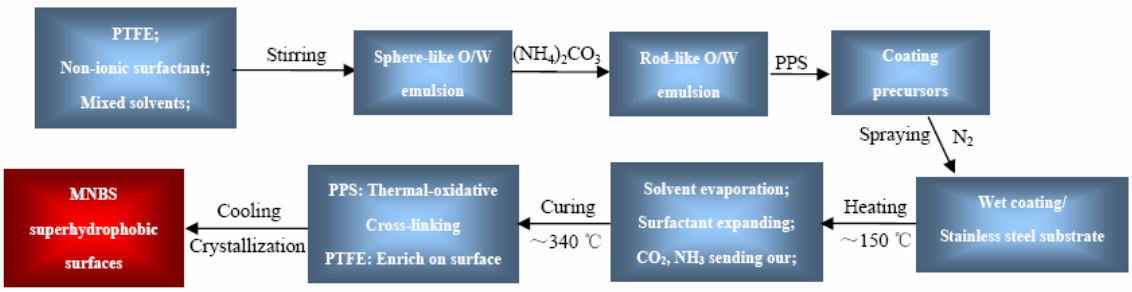

Scheme 1. The sketch map of the formation of the micro-nano binary structure (MNBS) of a PTFE/PPS coatings surface fabricated by conventional curing process.

Firstly, PTFE was dispersed in the mixed solvent containing non-ionic surfactant and $(NH_4)_2CO_3$ solution to ultrasonic stir for 30 min, obtaining the PTFE emulsion (O/W). To obtain the coating precursors, it was added into the PPS resin aqueous dispersion. The O/W emulsion of PTFE with about 50-100 molecules aggregates [1, 2] shows the coils shape because of the existence of $(NH_4)_2CO_3$ solution.[1, 2] Afterwards, the PTFE/PPS coating precursors were cured. With the increasing of curing temperature (～150°C), the mixed solvent (distilled water/ethanol/isobutyl alcohol) is evaporated

gradually, and non-ionic surfactant is expanded slowly.[1] Meanwhile, $(NH_4)_2CO_3$ solution is decomposed into CO_2 and NH_3, escaping from coatings precursors and forming porous network and micro-papilla or -island micro-structure.

[1] a) V.B. Fainerman, D. Mobius, R. Miller, *"Surfactants :Chemistry, Interfacial Properties ,Applications"*. Elsevier, Netherlands, **2001**. b) J.H. Clint, *"Surfactant Aggregation"*. Blackie, London, **1992**. c) B. Lindman, I. Danielson, *Colloids and surfaces*.**1981**, *3*, 391.

[2] a) J.M. Lehn, *Angew. Chem. Int Ed, Engl.* **1998**, *27*, 89. b) S.A. Walker, M.T. Kennedy, J.A. Zasadzinski, *Nature*. **1997**, *387*, 61.

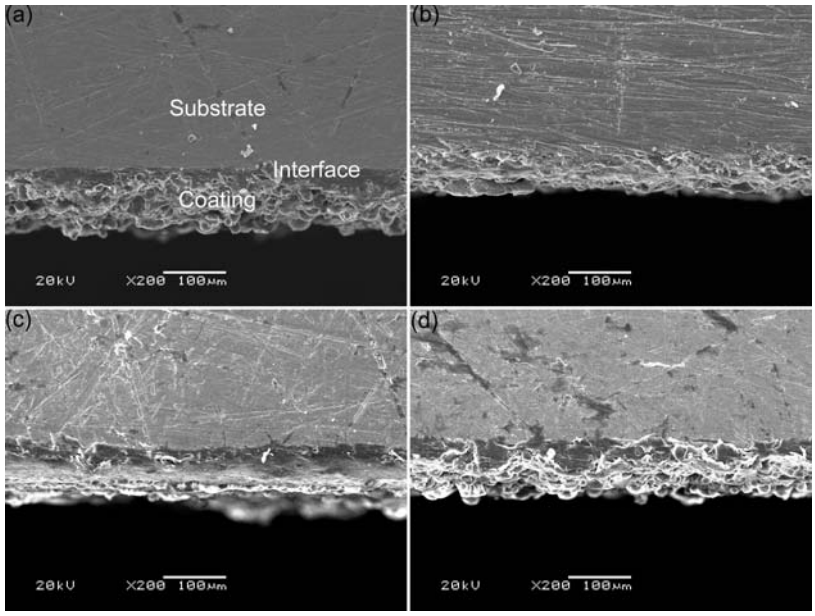

Figure S1. FE-SEM section images of PTFE/PPS superhydrophobic coating(a); soaked in 5 wt.% NaOH solutions (b); in 5 wt.% H_2SO_4 solutions (c) and in 5 wt.% NaCl solutions (d) for about 160 h.

From these images, we found that the section surface microstructure have no changed after it was immersed into acidic, basic, and salt solutions, respectively, indicating that the superhydrophobic surface have good stability for environment. At the same time, the interface between the substrate and the coating is very tight, no diastema found,

showing that the cohesional strength between the coating surface and the substrate (interface) is very well.

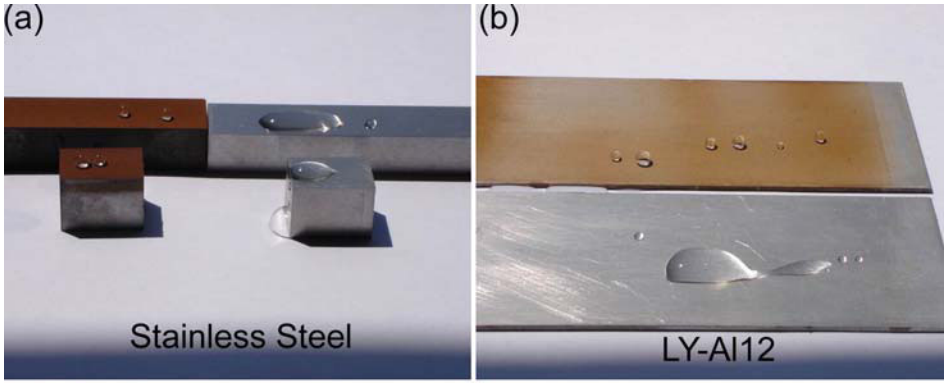

Figure S2. The optical images of the superhydrophobic surfaces and their corresponding substrates. (a) Stainless steel; (b) LY-Al12 alloy (Al 2024 alloy).

From these optical images, it is clearly seen that the dimensions of the employed substrates in this communication is not limited, changing from a few of centimeters to a few of meters. Currently, we are fabricating PTFE/PPS superhydrophobic coating on a spheroid of Al 2024 alloy (LY-Al12 alloy, 1400 mm in length, 110 mm in diameter).