Supporting Information

Vapor-based Synthesis and Micropatterning of Janus Thin Films with Distinct Surface Wettability and Mechanical Robustness

Yumin Ye,[*a] *Yu Mao*[*b]

[a] *Faculty of Materials Science and Chemical Engineering, Ningbo University, Ningbo 315211, China. E-mail: yeyumin@nbu.edu.cn*

[b] *Department of Biosystems Engineering, Oklahoma State University, Stillwater, Oklahoma 74078, United States. E-mail: yu.mao@okstate.edu.*

Nanoindentation

The hardness (H) of the films is obtained using the equation[1]:

$$H = \frac{P_{max}}{A_c} \tag{1}$$

where P_{max} is the maximum indentation force, A_c is the contact area corresponding to the contact depth (h_c) at the maximum load, which is calculated based on the function of tip area. The contact area, taken as a function of contact depth after indenter shape calibration, has such form as follows:

$$A = a_0 h_c^{\ 2} + a_1 h_c + a_2 h_c^{\ 1/2} + a_3 h_c^{\ 1/4} + a_4 h_c^{\ 1/8} \ldots \tag{2}$$

The Young's modulus of the specimen (E_s) is calculated from the reduced modulus of the specimen (E_r) using[1]:

$$\frac{1}{E_r} = \frac{1-\nu_s^2}{E_s} + \frac{1-\nu_i^2}{E_i} \tag{3}$$

where E_s and ν_s are the Young's modulus and Poisson's ratio of the specimen, respectively, and E_i and ν_i are the Young's modulus and Poisson's ratio of the indenter tip (made of diamond), respectively. The reduced modulus E_r is given by[1]:

$$E_r = \frac{(\sqrt{\pi} \cdot S)}{2\beta\sqrt{A}} \tag{4}$$

where β is a constant related to the indenter geometry and S is the slope of the initial portion of the unloading curve. Equations (2) and (3) along with the known values of the area function of the nanoindenter tip, the indent depth, the slope of the unloading curve, and the Young's modulus and

Poisson's ratio values for the indenter tip were used to determine the Young's modulus for the specimen.

Reference:

1. *Theory of Instrumented Indentation Testing*. Customer Care Kit, MTS Systems Corporation: Oak Ridge, TN, 2000.

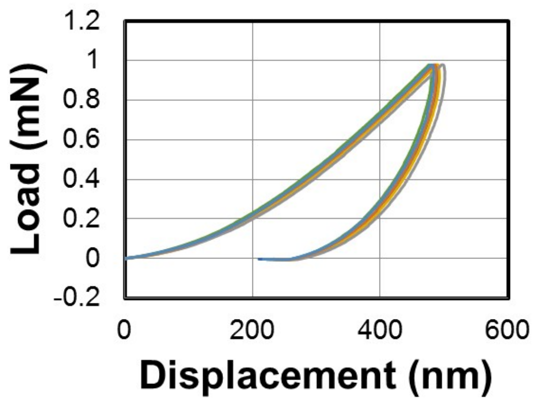

Fig. S1 Indentation Load-Displacement Curves of the Janus film.