



## Supporting Information

for *Adv. Sci.*, DOI: 10.1002/advs.201700520

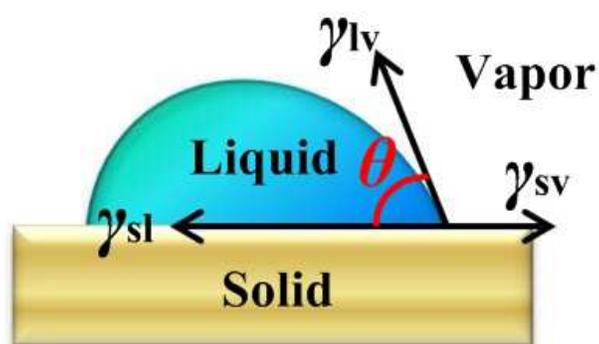
Computational Intelligence-Assisted Understanding of Nature-Inspired Superhydrophobic Behavior

*Xia Zhang, Bei Ding, Ran Cheng, Sebastian C. Dixon, and Yao Lu\**

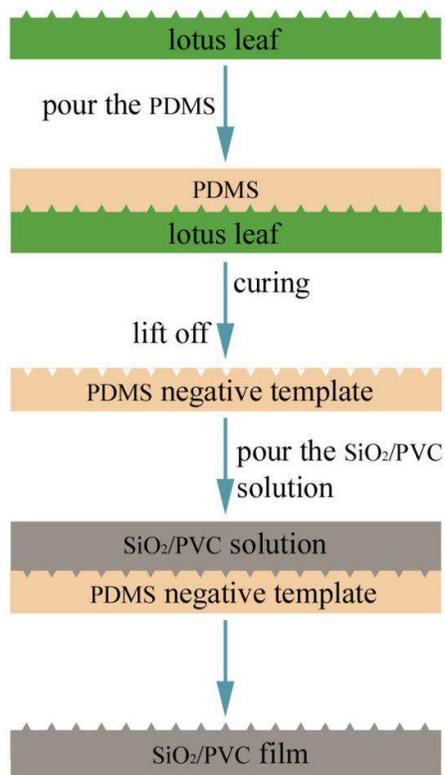
## Supporting Information

**Computational intelligence assisted understanding of nature-inspired superhydrophobic behavior**

*Xia Zhang, Bei Ding, Ran Cheng, Sebastian C. Dixon, and Yao Lu\**



**Figure S1.** In Young's model,  $\gamma_{lv}$ ,  $\gamma_{sv}$  and  $\gamma_{sl}$  refer to the interfacial tensions of liquid-vapor, solid-vapor, and solid-liquid phases, respectively. The contact angle  $\theta$  is defined as  $\cos \theta = (\gamma_{sv} - \gamma_{sl})/\gamma_{lv}$ .



**Figure S2.** Schematic illustration of fabricating SiO<sub>2</sub>/PVC film surface with positive lotus leaf surface topographies.

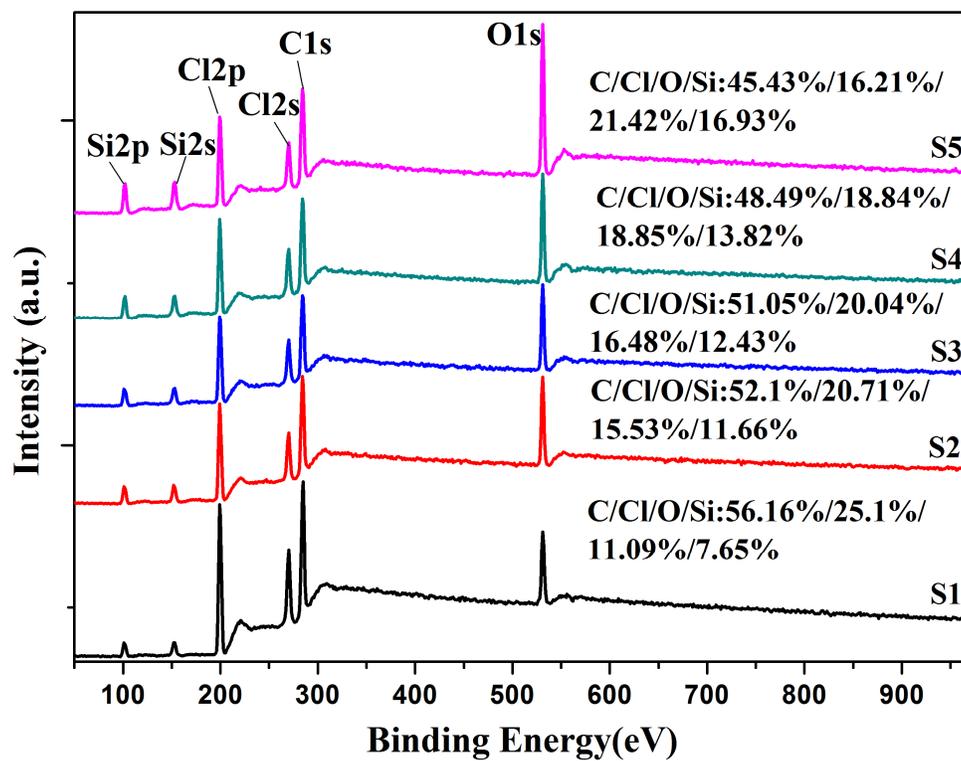
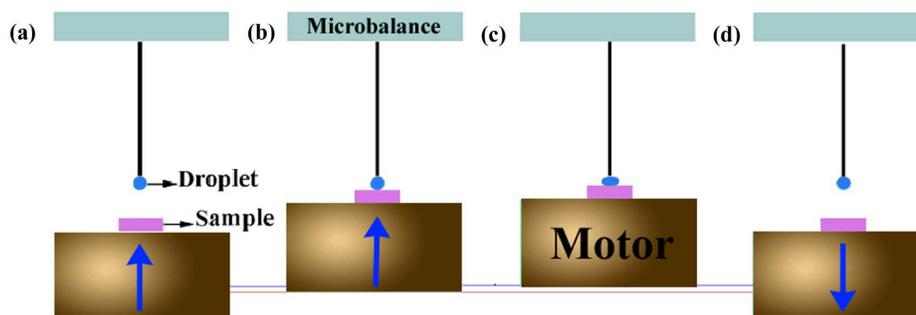
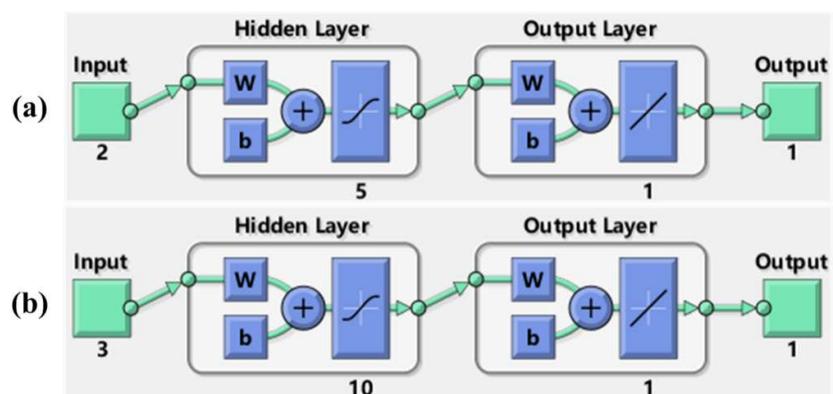


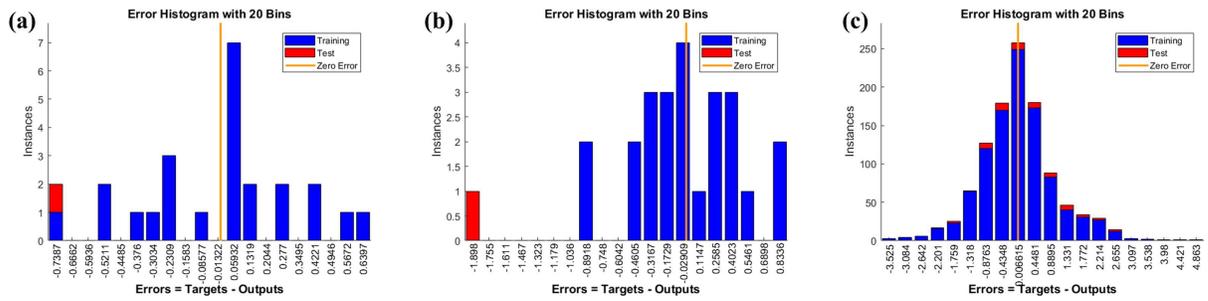
Figure S3. XPS survey spectra of Samples S1 to S5.



**Figure S4.** Schematic illustration of the micro-electromechanical balance collected data measuring the adhesive force of the droplet on the substrate. The water droplet was suspended by a copper ring and the samples were positioned onto a stage under the water droplet: (a) the stage (motor) moved up towards the suspended droplet at a rate of 0.03 mm/s (b and c) upon contact with the droplet and (d) the stage moved downwards at the same rate.



**Figure S5.** Structures of the networks used for modelling the functional mappings of  $f_1$ ,  $f_2$  and  $f_3$ . (a) Network structure for the regression of  $f_1$  or  $f_2$ . Inputs are  $X_1$  and  $X_2$ , and output is  $Y_1$  or  $Y_2$ . The number of hidden neurons is 5. (b) Network structure for the regression of  $f_3$ . Inputs are  $X_1$ ,  $X_2$  and  $X_3$ , and output is  $Y_3$ . The number of hidden neurons is 10.



**Figure S6.** The training and test errors of the neural networks for the regressions of (a)  $f_1$ , (b)  $f_2$  and (c)  $f_3$ , where the number of data instances in each dataset is 25, 25 and 1083, respectively. For each dataset 90%, 5% and 5% data instances are used as training, validation and test data, respectively.