

Supplementary Materials

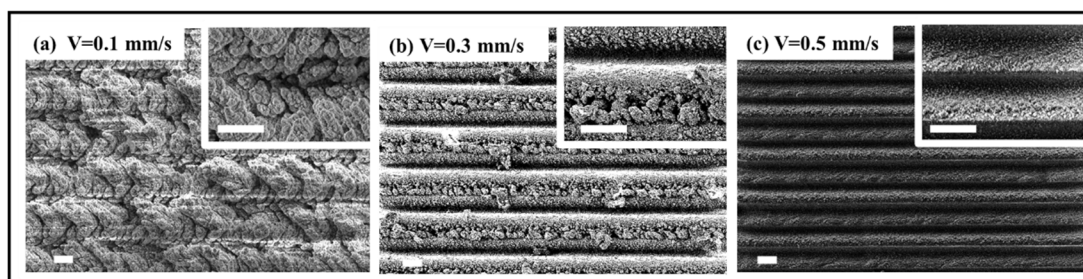
# Long-Time Persisting Superhydrophilicity on Sapphire Surface via Femtosecond Laser Processing with the Varnish of TiO<sub>2</sub>

Dandan Yan <sup>1,2</sup>, Zhi Yu <sup>1</sup>, Tingting Zou <sup>1</sup>, Yucai Lin <sup>1,2</sup>, Wencheng Kong <sup>1,2</sup> and Jianjun Yang <sup>1,\*</sup>

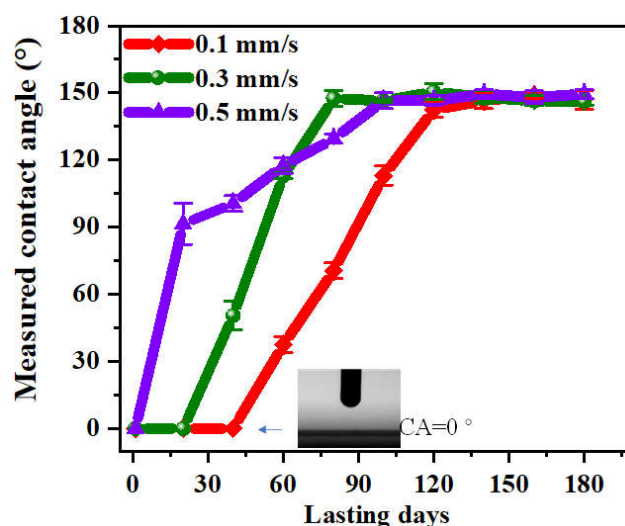
<sup>1</sup> GPL Photonics Laboratory, State Key Laboratory of Applied Optics, Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences (CAS), Changchun 130033, China; yandandan18@mails.ucas.ac.cn (D.Y.); zyu@imr.ac.cn (Z.Y.); zoutingting@ciomp.ac.cn (T.Z.); linyucai20@mails.ucas.ac.cn (Y.L.); kongwenchi17@mails.ucas.ac.cn (W.K.)

<sup>2</sup> Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049 China.

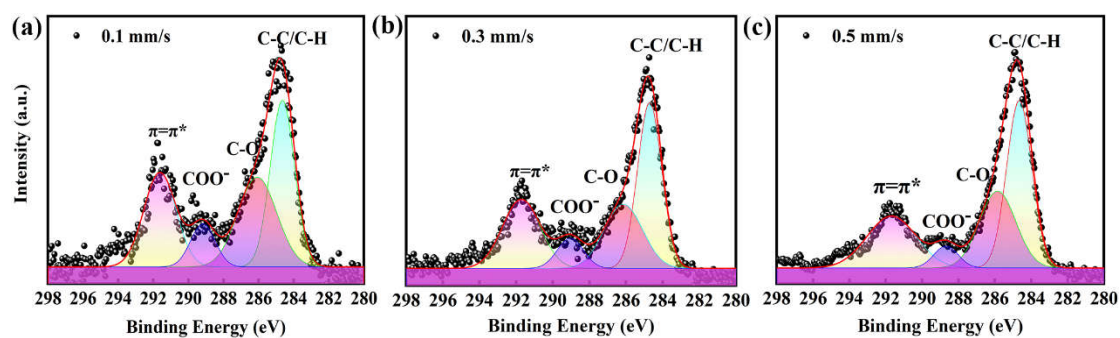
\* Correspondence: jjyang@ciomp.ac.cn



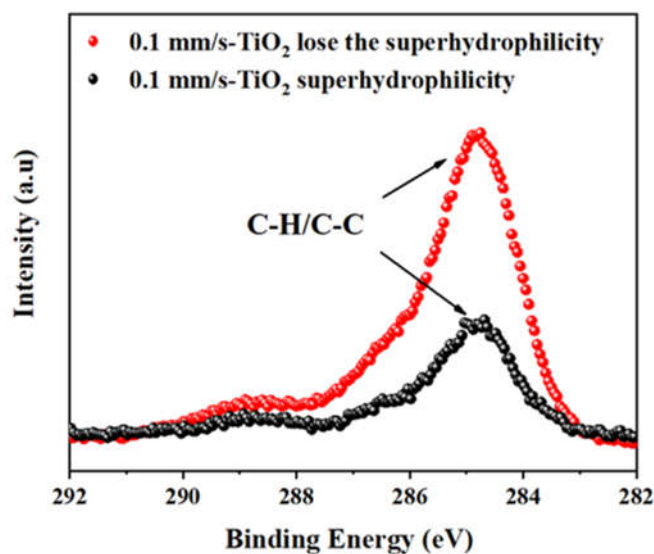
**Figure S1.** Observation of the surface morphologies after femtosecond laser processing with different scanning speeds (a–c). Scale bars are 30  $\mu\text{m}$ .



**Figure S2.** Measured superhydrophilic permanence over the time for three different samples without TiO<sub>2</sub> varnish. Superhydrophilic (CA = 0°) property of V=0.1, 0.3, 0.5 mm/s can be maintained for 45 days, 17 days and a few days, respectively.



**Figure S3.** Measured XPS results of C 1s spectra for the laser treated samples with different scanning speeds (a–c).



**Figure S4.** Measured XPS results of the sample surfaces before and after losing the superhydrophilicity. Clearly, there is a significant increase in the hydrophobic group C-C/C-H; moreover, the atomic percentage of the carbon element on the surface is increased by 9.42%. This indicates that some uncoordinated  $\text{Al}^{3+}$  ions are still present on the structured surface.