

Supporting Information

Synthesis of superhydrophobic flower-like ZnO on nickel foam

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1. UV-visible spectra of ZnO

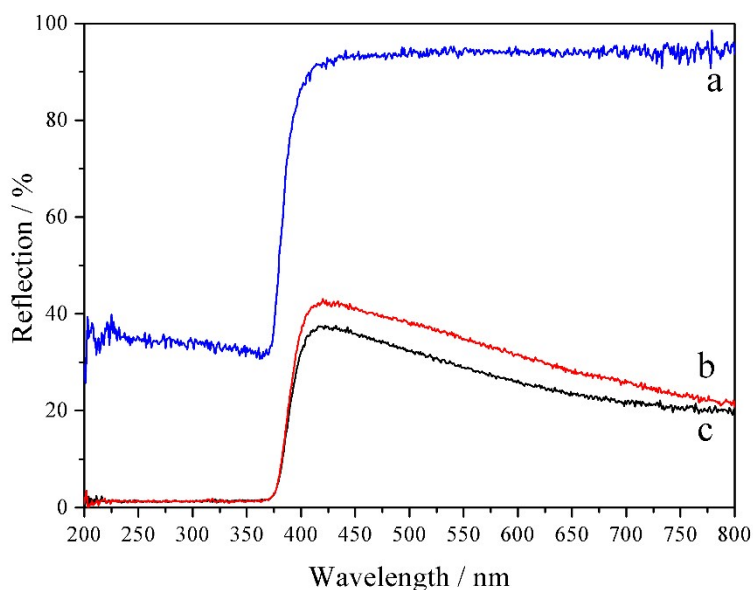


Fig. S1 UV-visible reflectance spectra of ZnO. (a) ZnO powder with particle sizes of several microns; (b) superhydrophobic ZnO layer grown on nickel foam (MH4); (c) ZnO layer grown on nickel foam without hydrophobic treatment (M4).

Fig. S1 shows the UV-visible reflectance spectra of ZnO. ZnO powder with a particle size of several microns reflects 93% of the light in the region of 400-1000 nm back and starts to absorb light at approximately 400 nm (Fig. S1a). However, 35% of light with wavelengths lower than 400 nm is still reflected. The ZnO layer grown on nickel foam without hydrophobic treatment shows less than 40% reflection in the region of 400 - 1000 nm (>55% black) and absorbs all light below 400 nm. After hydrophobic modification, the adsorption property of the superhydrophobic ZnO layer is similar with the ZnO layer without hydrophobic treatment. The absorption in the visible-light region of the ZnO layer seems to be related to the hole defects created by the

decomposition of the $\text{ZnC}_2\text{O}_4 \cdot \text{Zn}(\text{OH})_2$ precursor. The hole defects, which may cause the existence of zinc vacancy defects and the structure disordered layer, are beneficial for the charge trapping and the light adsorption.

2. Photocatalytic performance

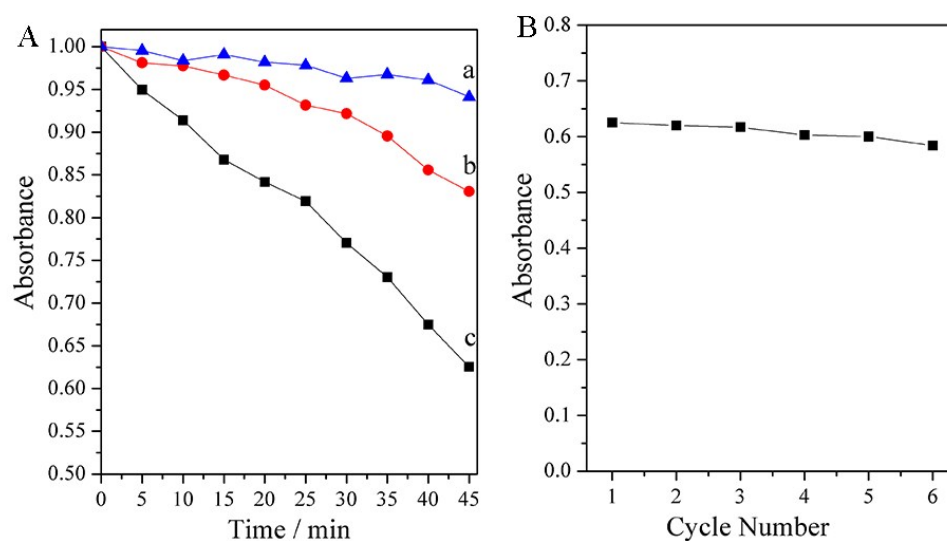


Fig. S2 (A) The time profile of methylene blue decomposition with (a) ZnO powder separated from MH4, (b) ZnO powder with particle sizes of several microns, and (c) ZnO powder separated from M4. (B) Cycling tests of solar-driven photocatalytic activity in methylene blue decomposition with ZnO powder separated from M4.

Fig. S2A shows a comparison of the solar-driven photocatalytic activity of ZnO powder under the same experimental conditions. After 60 min of irradiation, 25% of methylene blue is decomposed by ZnO powder with a particle size of several microns, and 53% is decomposed by ZnO powder separated from M4, compared to 0.05% for superhydrophobic ZnO powder separated from MH4. The ZnO powder separated from M4

has the best performance. Moreover, the ZnO powder separated from M4 shows good stability in the cyclic photocatalytic decomposition of methylene blue as shown in Fig. S2B. No apparent decrease in activity is observed. This suggests the excellent stability of the photocatalytic performance of the ZnO powder separated from M4. The improved photocatalytic performance is likely related to the coexistence of zinc vacancy defects and the structurally disordered layer which are beneficial for charge trapping and photocatalytic reactions and long-wavelength absorption. The poor photocatalytic performance of superhydrophobic ZnO powder separated from MH4 can be attributed to the repulsion of the superhydrophobic surface to water and methylene blue.