Supporting Information

Controlled Synthesis of Silver Phosphate Crystals with High Photocatalytic Activity and Bacteriostatic Activity

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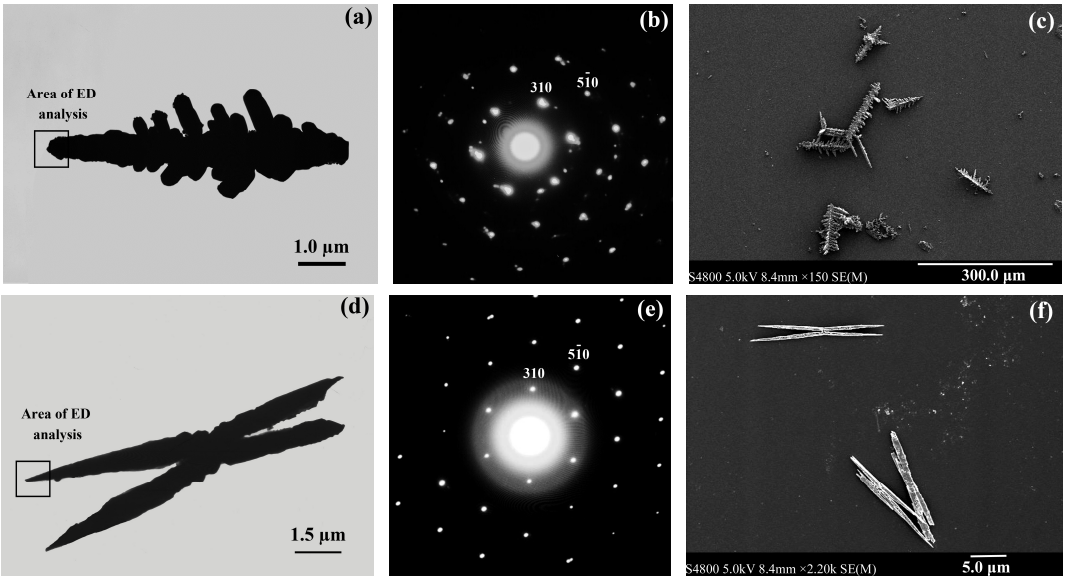
Figure S1 showed TEM and SEM images and electron diffraction patterns recorded on pine tree shape, chromosome shape, hex-cross shape, and spinning-top shape of Ag_3PO_4 crystals, respectively. The results demonstrated the controlled growth of vertically aligned Ag_3PO_4 crystals in the [100] orientations. The similar controls have also been achieved over the orientation of Ag_3PO_4 crystals. Furthermore, the structures of Ag_3PO_4 crystals always remained the same cubic phase when Ag_3PO_4 crystals grew under different reagents.



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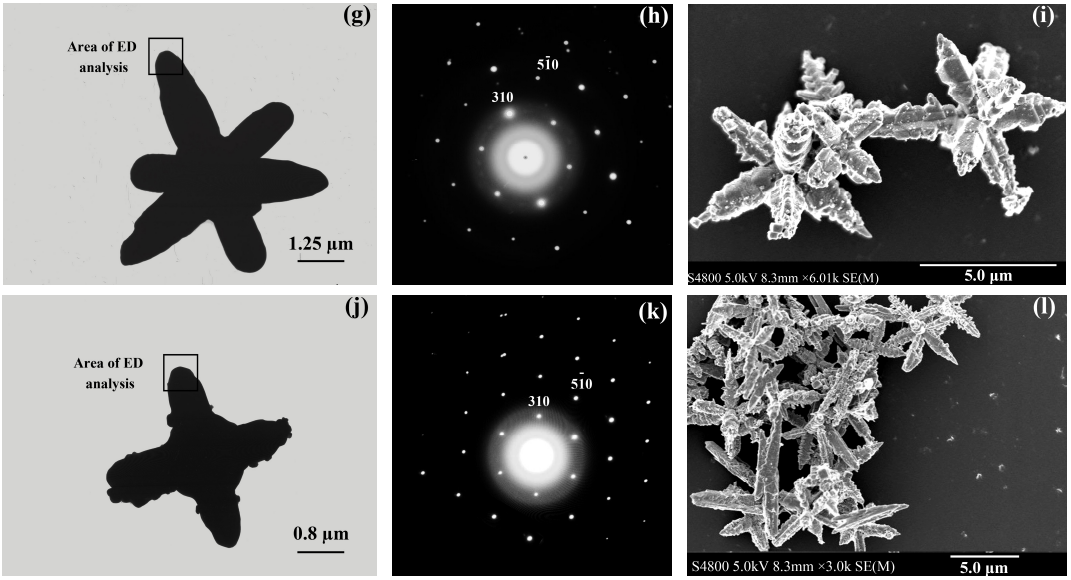

Figure S1. The TEM and ED images of the Ag_3PO_4 crystals synthesized under different addition reagents: (a) no reagent; (b) 1 g/L of Triton-100; (c) 1 g/L of polyglycol-400; (d) 1 g/L of sodium polyacrylate.

The approximate absorption spectra in the FT-IR spectra provided an accessorial explanation that the products had the same crystal structure. The corresponding FT-IR spectrum of the products was shown in Figure S2. The spectrum bands at 3435, 2350, 1635, 1390, 1015 and 560 cm^{-1} were assigned to water ν_1(H-O-H) antisymmetric bending mode, water-phosphate H bonding, $\nu_2(PO_4^{3-})$ antisymmetric stretching mode, $\nu_3(PO_4^{3-})$ symmetric stretching mode and $\nu_3(PO_4^{3-})$ in-phase P-O bend [S1] respectively.

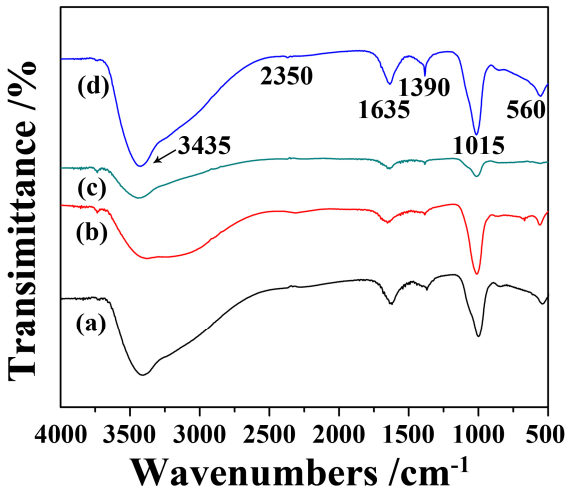

Figure S2 The FT-IR spectra of the silver phosphate synthesized under different addition reagents: (a) no reagent; (b) 1 g/L of Triton-100; (c) 1 g/L of polyglycol-400; (d) 1 g/L of sodium polyacrylate.

Their Raman spectra were shown in Figure S3. Raman scattering was a powerful tools for observing the synthesis of Ag_3PO_4 crystals under different organic addition reagents. The absorption bands at 500 and 720 cm^{-1} were attributed to P-O bending and stretching vibration. The absorption band within 200-250 cm^{-1} was the H-O-H stretching broad.

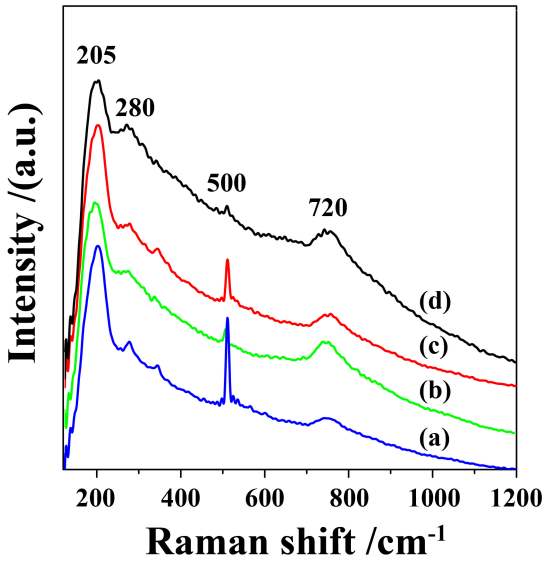

Figure S3 FT-Raman spectra of Ag_3PO_4 crystals synthesized under different addition reagents: (a) no reagent; (b) 1 g/L of Triton-100; (c) 1 g/L of polyglycol-400; (d) 1 g/L of sodium polyacrylate.

Figure S4 displayed the N_2 adsorption/desorption isotherms of the Ag_3PO_4 crystals under different addition reagents. The Ag_3PO_4 crystals under different addition reagents exhibited the type II adsorption isotherm without prominent rise at $p/p_0 < 0.1$ and with a marginal hysteresis at $p/p_0 > 0.9$. The BET surface area was evaluated to be 1.5, 1.2, 16.6 and 15.6 m^2/g for Ag_3PO_4 crystals under the different condition, (a) no reagent; (b) 1 g/L of Triton X-100; (c) 1 g/L of polyglycol-2000; (d) 1 g/L of sodium polyacrylate, respectively [S2].

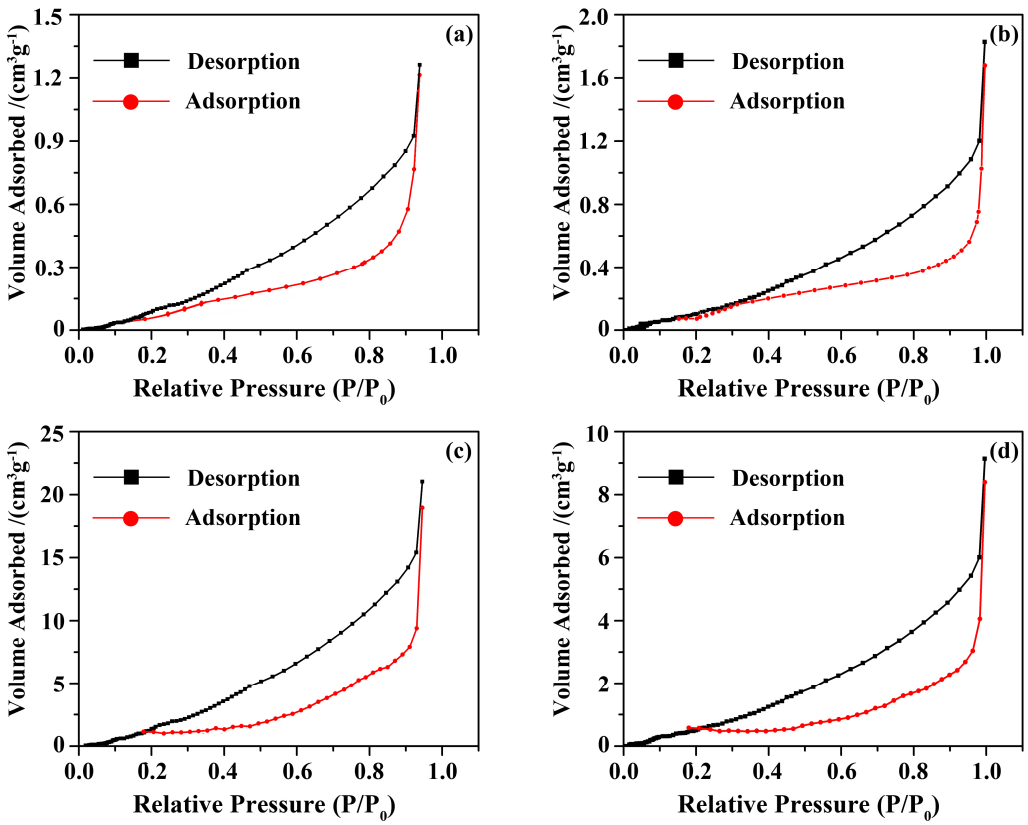

Figure S4 Nitrogen adsorption-desorption isotherms of Ag_3PO_4 crystals under different addition reagents: (a) no reagent; (b) 1 g/L of Triton X-100; (c) 1 g/L of polyglycol-2000; (d) 1 g/L of sodium polyacrylate.

S1. Qian, G. R.; Xu, X.; Sun, W. M.; Xu, Y. F.; Liu, Q. ***Mater. Res. Bull.*** 2008, 43: 3463-3473.

S2. Toshiaki, T.; Patchanee, C.; Vu, Q. T.; Toshiki, F.; Minoru, T. ***Appl. Catal. A-Gen.*** 2012, 437/438: 24-27.