Supporting Information for

In-situ oxidation synthesis of Ag/AgCl core-shell nanowires and their photocatalytic properties

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Experimental Section

1 Synthesis of Ag nanowires

The Ag nanowires were prepared by a modified polyol process. In a typical synthesis, 1,3-butylene glycol (1, 3 BG, 10mL) that contained poly (vinyl pyrrolidone) (PVP, $M_W \approx 50000$, 150 mM as calculated in terms of the repeating unit) was placed in a 25-mL vial, capped, and heated with stirring in an oil bath at 160 °C for 1 h. 1 mL Na_2S solution (1 mM in 1, 3 BG) was then quickly added. After 5 min, $AgNO_3$ (0.15 M solution in 1, 3 BG) were added with drop by drop to the stirring solution. The vial was then capped and heated at 160 °C for 30 min. After injection of the $AgNO_3$ solution, the color of reaction mixture changed from dark to blue, then to light yellow, and ocher color. The samples for morphology and structure analysis were washed with acetone and water to remove excess ployols and PVP via centrifugation, finally was dissolved in water.

2 Synthesis of Ag/AgCl core-shell nanowires

In a typical Ag/AgCl core-shell nanowires synthesis, the reaction mixture containing the as-synthesized Ag nanowires (10 mg) solution was added to aqueous solution (PVP 50 mM). Aqueous $FeCl_3$ (0.02M) was slowly added dropwise to this Ag nanowire solution. The resulting mixture was maintained at room temperature until its color became brown. Vigorous stirring was employed throughout the synthesis. The obtained samples for morphology and structure analysis were washed with water and ethanol to remove the $FeCl_3$ and PVP via centrifugation. Finally, the obtained Ag/AgCl samples were dissolved in water.

3 Photocatalytic tests

The Ag/AgCl core-shell catalysts with various proportions were selected from the nanoproducts synthesized with different reaction times. In all catalytic activity of experiments, the samples (0.1 g) were put into a solution of MO dye (100 ml, 40 mg/L,), which was then irradiated with a 300W Xe arc lamp equipped with an ultraviolet cutoff filter to provide visible light with $\lambda \geq 420$ nm. The degradation of MO dye was monitored by UV/Vis spectroscopy (UV-2550, Shimadzu). Before the spectroscopy measurement, these nanowire catalysts were removed from the photocatalytic reaction systems by a dialyzer.

4 Characterizations

SEM and FE-SEM images were taken using a field-emission scanning electron microscope (JSM-6701F, JEOL) operated at an accelerating voltage of 5 kV. The X-ray diffraction spectra (XRD) measurements were performed on a Philips $X^{'}$ pert MPD instrument using Cu Kα radiation (50 kv). The XRD patterns were recorded from 10° to 90°with a scanning rate of 0.067°/ s. UV/Vis absorption spectra were taken at room temperature on a UV-2550 (Shimadzu) spectrometer.

Additional Figures

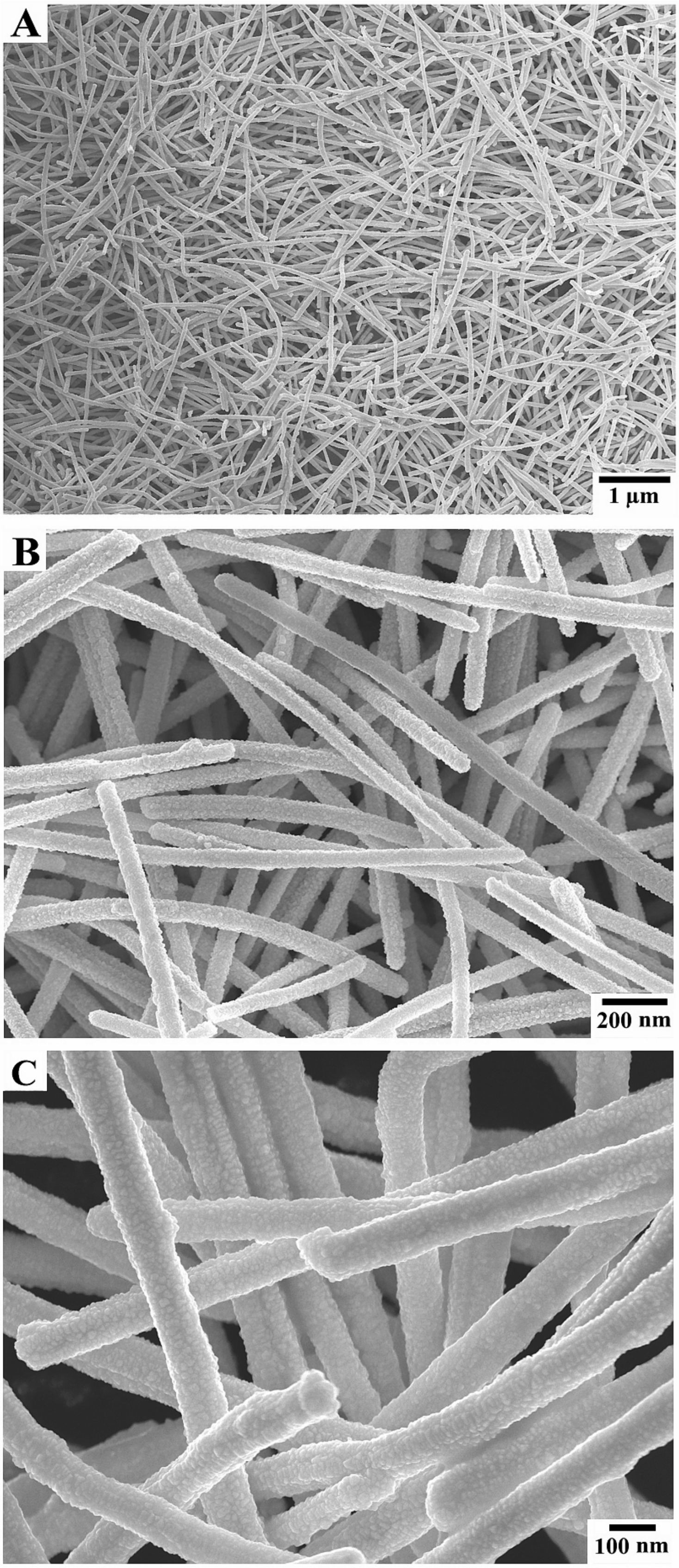

Fig. S1. (A-C) SEM images of Ag/AgCl core-shell nanowires with different magnifications.

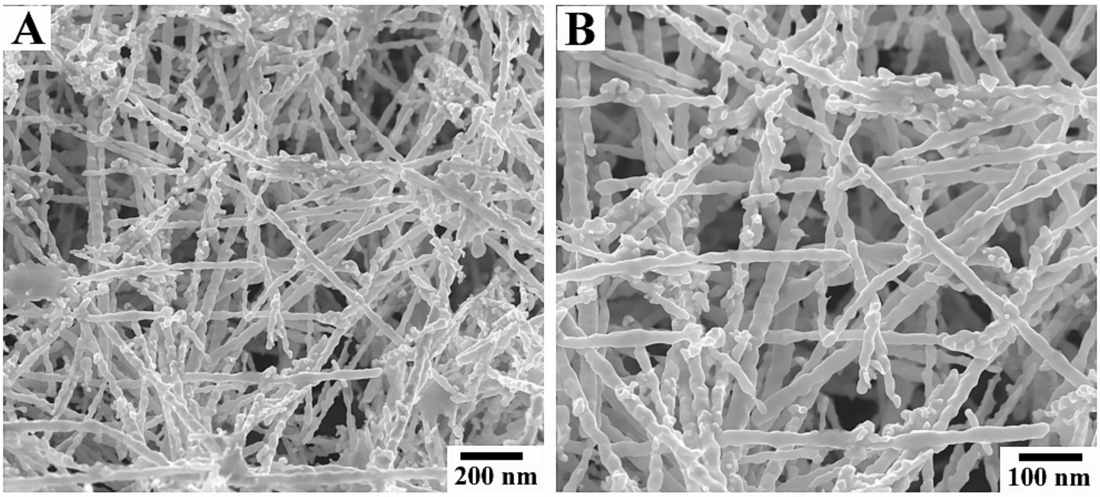

Fig. S2. (A, B) SEM images of Ag core nanowires.

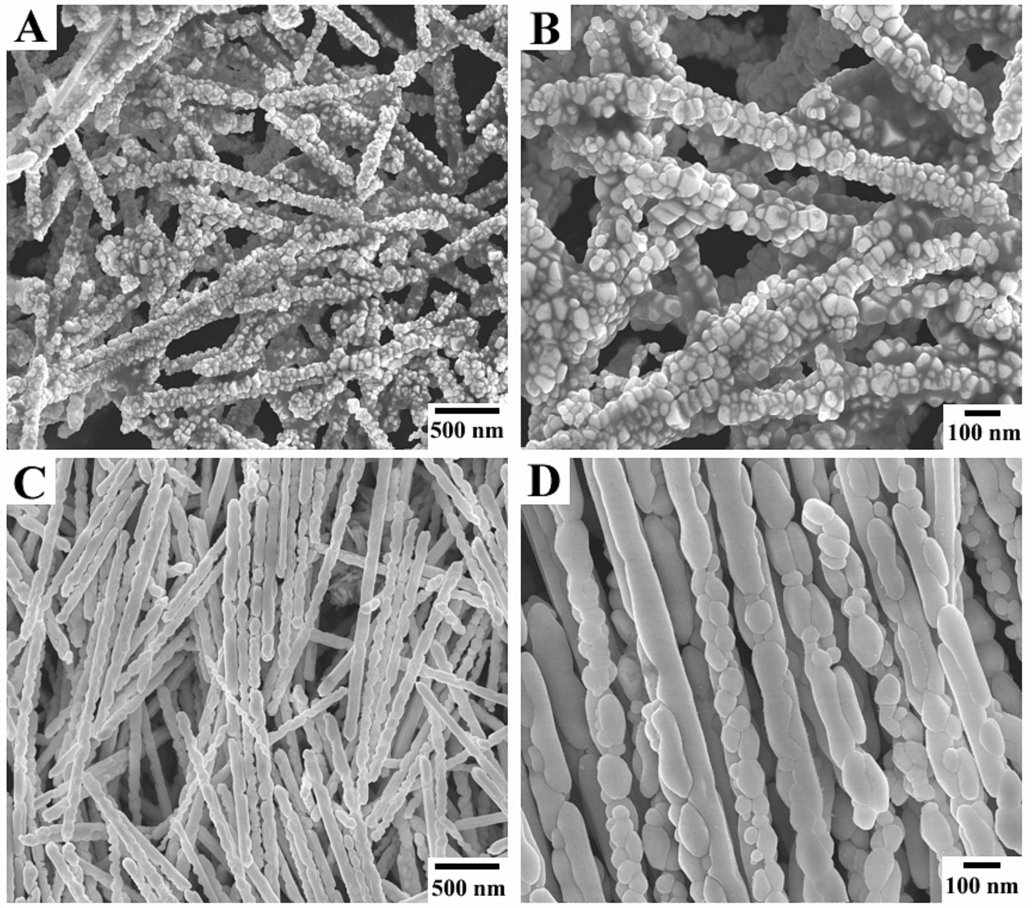

Fig. S3. (A, B) SEM images of the Ag/AgCl nanoproducts prepared in the absence of PVP; (C, D) SEM images of the Ag/AgCl nanoproducts prepared in the presence of CTAC.

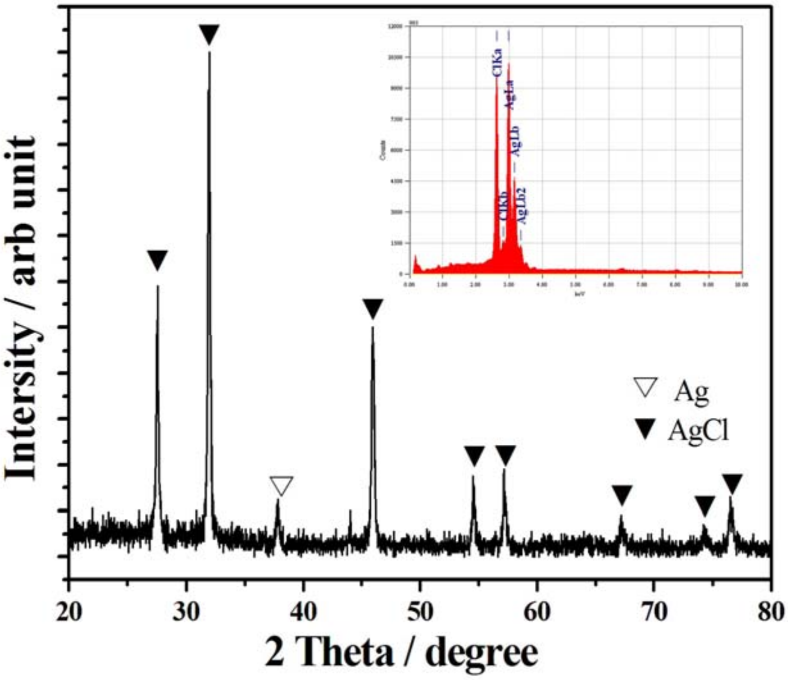

Fig. S4. XRD and EDS patterns of the Ag/AgCl nanoproducts prepared in $CuCl_2$ solution.