Supporting Information

Layered Copper Metagermanate Nanobelts: Hydrothermal Synthesis, Structure and Magnetic Properties

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Experimental

A. Synthesis of layered CuGeO_3 nanobelts. The analytical grade reagent GeO_2 and $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ were used as starting materials. In a typical procedure, 0.1 g of cetyltrimethylammonium bromide (CTAB) was dissolved in 15 mL distilled water which had been purged with nitrogen for 1 h. 5 mmol of GeO_2 and 5 mmol $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ was then added continuously under magnetic stirring. The reaction mixture was sealed in a Teflon-lined autoclave of 20 mL inner volume, heated at 180 °C for 1 day, and then air-cooled to room temperature. After filtration, the precipitates was washed thoroughly with water and alcohol and dried at 60 °C in air for 12 h. A light blue powder was subsequently obtained in yield about 87%.

B. Preparation of CGO bulk crystals.

In a typical synthesis procedure, the initial mixture with a molar ratio of GeO_2 : $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ = 1:1 were ground carefully, collected and calcined up to 900 °C with a ramp rate of 5 °C·min⁻¹. CGO bulk crystals with light blue color were obtained.

Figure S1. TGA and DTA curves collected from the pure CTAB (top) and the as-synthesized CuGeO₃ nanobelts in the presence of CTAB (bottom). In all graphs, dashed lines correspond to the DTA curves and solid lines correspond to the TG curves.

As expected, the TGA-DTA of pure solid CTAB exhibits a single mass loss, a distinct exothermic peak accompanied by 100% mass loss occurred at temperatures in the range of 200-270 °C. On the other hand, the TGA curve of obtained CuGeO₃ nanobelts can be divided into three stages. In the first stage, no other components but lattice H₂O molecules were released before 300 °C with a mass loss of about 1 %. Two sequential exothermic peaks between 300 and 550 °C with a general mass loss of 10.0% can be attributed to the CTA⁺ decomposition and the elimination of bromide species. The fact that the synthesized CuGeO₃ nanobelts is thermally stable until 550 °C, suggesting the affinity between the CTA⁺ cations and the bonding sites of the oxide layers, which is effective in improving the thermal stability of CTAB, as reported for a layered MoO₃-CTAB material (Song, R. Q.; Xu, A. W.; Deng, B.; Fang, Y. P. *J. Phys. Chem. B* **2005**, *109*, 22758).

Figure S2. SEM images of the obtained layered CuGeO₃ nanobelts by hydrothermal treatment.

Figure S3. EDX spectrum of the obtained layered CGO nanobelts.

Figure S4. Temperature dependence plots of the magnetic susceptibilities measured under $H = 1 - 4 \text{ T}$ for CGO bulk crystals synthesized by a sintering method (see experimental B).

Figure S5. SEM image of CGO bulk crystals synthesized by a sintering method at 900 °C.

Figure S6. Low-angle XRD (left) and wide-angle XRD patterns of as-synthesized CGO nanobelts through removal of CTA^+ by calcination at 800 °C for 6 h. No peaks can be observed in low-angle XRD pattern after calcination. Wide-angle XRD pattern shows that calcined as-synthesized CGO nanobelts are pure CGO crystals.

Figure S7. Temperature dependence plots of the magnetic susceptibility measured under $H = 1 - 5$ T for calcined layered CGO nanobelts by removal of CTA^+ at 800°C for 6 h.