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Synthesis and identification of hierarchical γ-AlOOH self-assembled by nanosheets with adjustable exposed facets

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Supporting Information

Figure S1 demonstrates the FT-IR spectra of samples A and B. The absorption bands appearing at 3330, 3100, 2096, 1634, 1382, 1159, 1068, 738, 618 and 476 cm^{-1} are the characteristic indication of γ-AlOOH.[1-3] On the other side, the absorption bands of NO_3^- and SO_4^{2-} are generally located within 1410~1340 cm^{-1} and 1210~1040 cm^{-1}, respecticely, which might be overlaped by the typical bands of γ-AlOOH. However, the existence of NO_3^- and SO_4^{2-} in the bulk of γ-AlOOH can be excluded because for both samples of γ-AlOOH the bands at1382, 1159, 1068 cm^{-1} emerges simultaneously in these two regions while the aions of NO_3^- and SO_4^{2-} were employed separately during the preparation of samples. Therefore, the FT-IR spectra points to the simple crystal structure of γ-AlOOH with high purity for two samples.

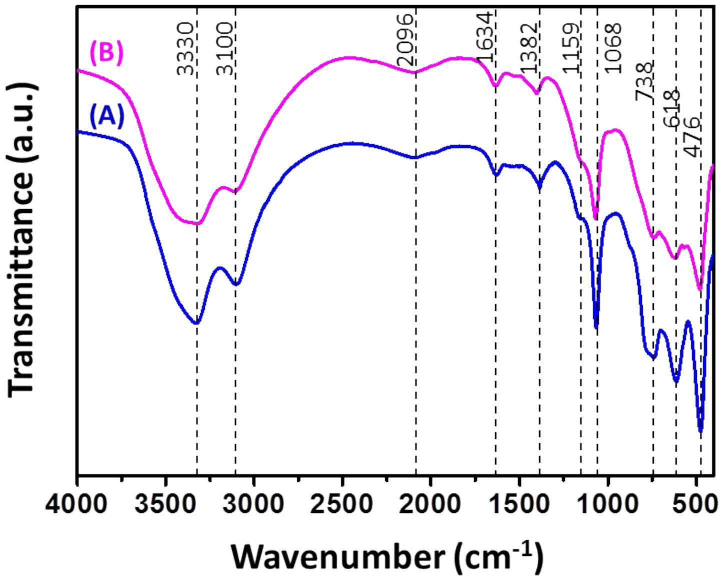
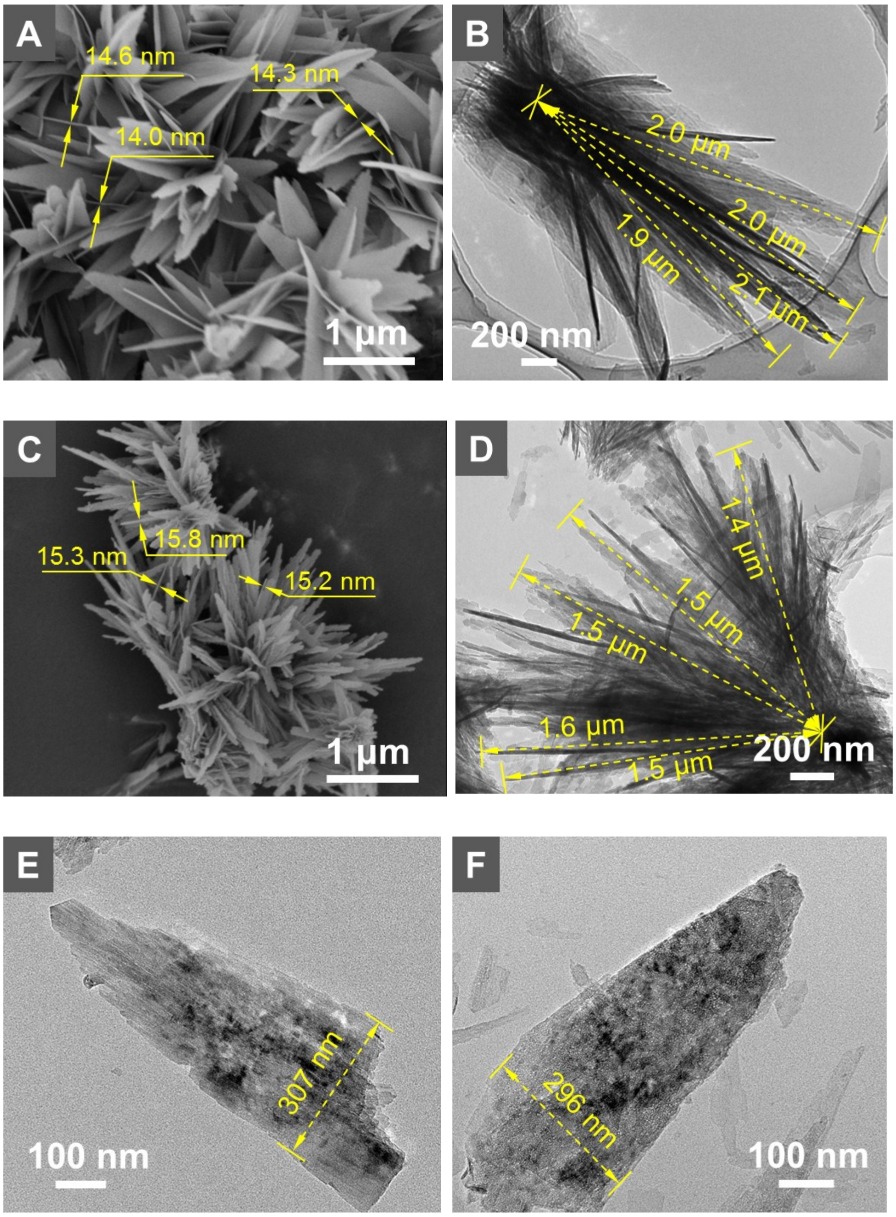


Figure S1. FT-IR spectra of sample A (A) and sample B (B).

Figure S2 illustrates the SEM and TEM images of samples A and B. The dimension measurement of nanosheets was performed on the SEM and TEM images where various nanosheet azimuth could be found. The every statistical average value of three dimensions of nanosheets was obtained by measuring at least twenty specimens. As the nanosheets were self-assembled up to a bundle, we took the epitaxial length as the effective length (Figure S2 (B) and (D)). Meanwhile, the width was determined near the middle of a single nanosheet, as shown in the Figure S2 (E~H). As a matter of fact, the fluctuation in length and width was found to have very slight effect within 0.5% on the proportions of exposed facets during calculation.



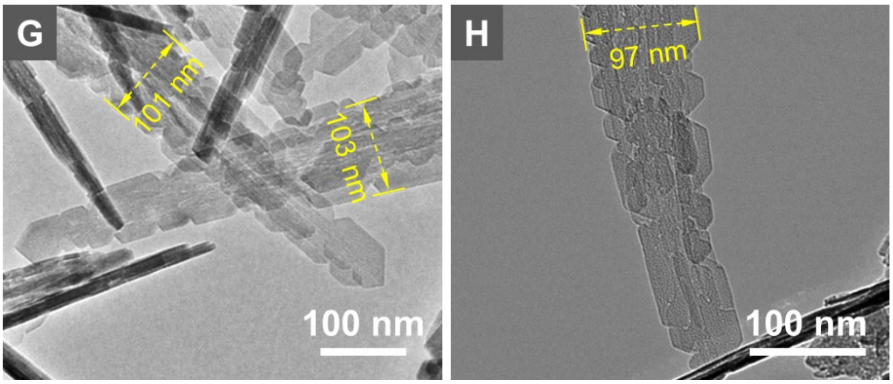


Figure S2. SEM image (A) and TEM images (B, E and F) of sample A giving schematic measurment of dimensions in length, width and thickness. Countpart SEM image (C) and TEM images of sample B (D, G and H) and the measured results.

Figure S3 demonstrates the XRD profile of the spheres obtained after first stage of thermal treatment at 100 ºC, manifesting the amorphous structure of the product.

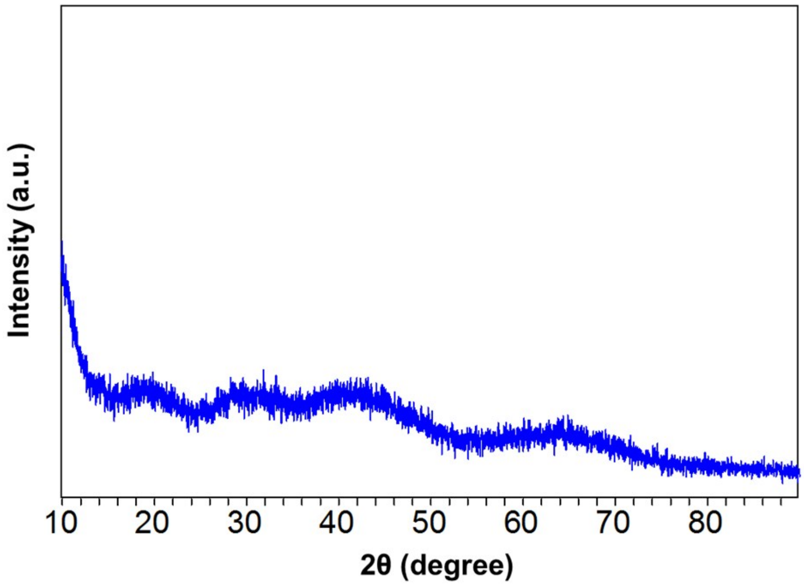


Figure S3. XRD profile of the product after first stage at 100 ºC.

Figure S4 exhibits the formation evolution of the architecture of sample B at different periods of thermal treatment.

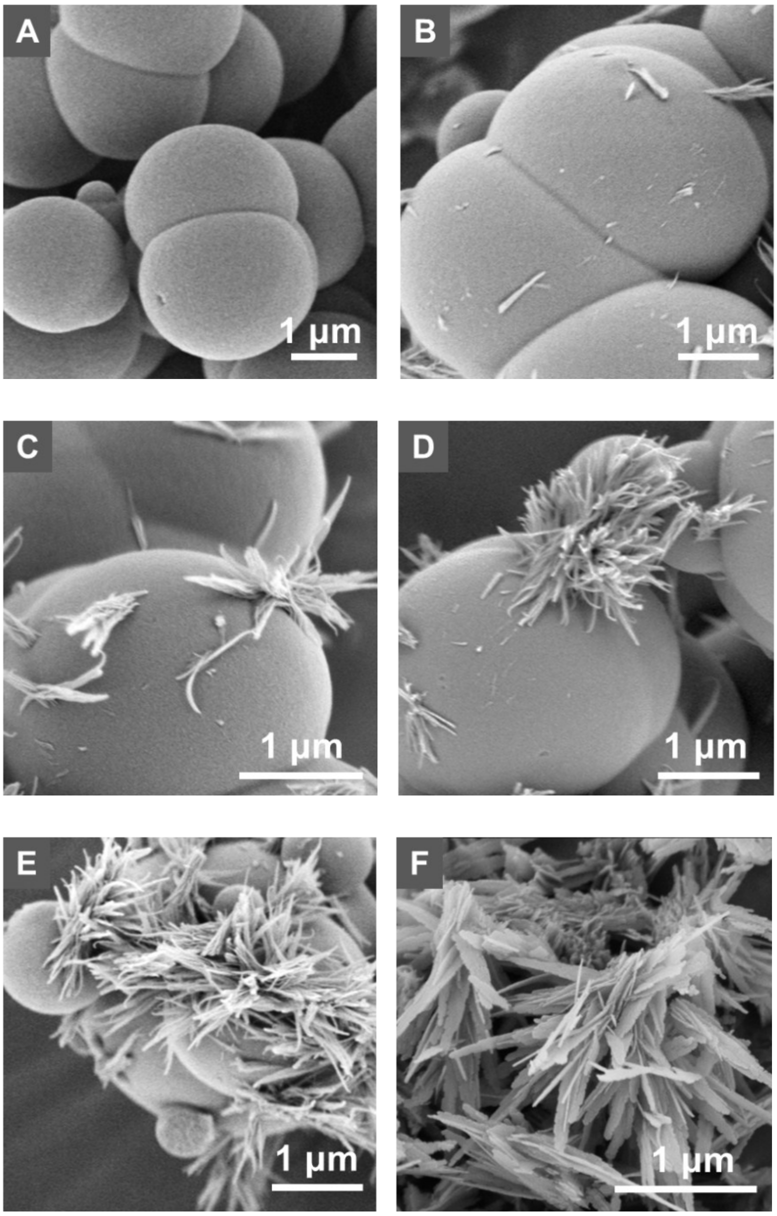


Figure S4. SEM images of sample B synthesized at the second solvo-thermal stage at 180 ºC for different duration time: (A) 0 h (extracted after finishing the first stage performed at 100 ºC); (B) 30 min; (C) 45 min; (D) 1 h; (E) 1.5 h; (F) 2 h.

References

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