

# A closer look at the synthesis and formation mechanism of hematite nanocubes

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## Supplementary Information

## 1. SEM characterization

Scanning Electron Microscopy (SEM) measurements were performed using a field emission gun equipped SEM (FEI XL30 Sirion FEG). SEM sample was prepared by drying 0.01 vol% of nanoparticles (suspended in water) on a carbon grid (2.5 cm in diameter). The carbon grid was fixed on top of a SEM pin stub.

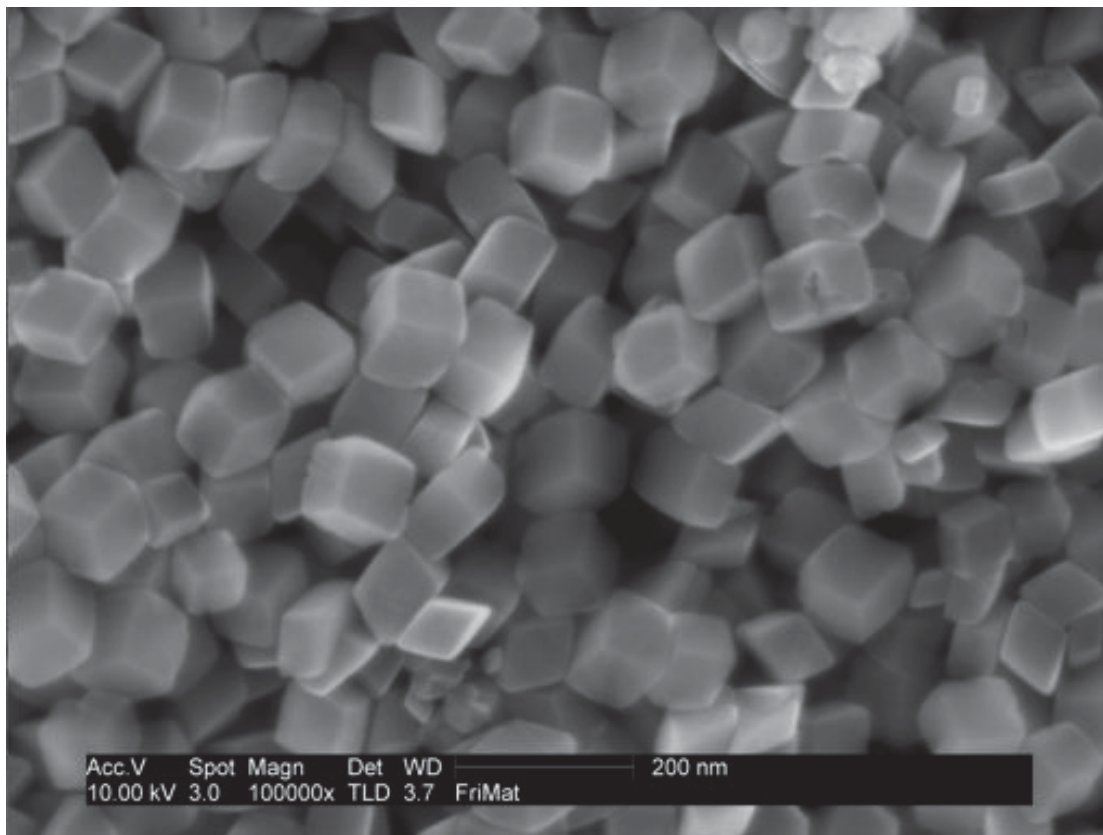


Fig. 1: SEM image shows the cubic morphology of the hematite nanoparticles obtained in sample S2. The sample was prepared by drying a drop of S2 on a carbon substrate.

## 2. XRD characterization

X-ray powder diffraction (XRD) patterns of the products were measured on a X-ray diffractometer (XRD-IC100P) in the  $2\theta$ -range of  $10^\circ$ - $80^\circ$ . The powder samples (20 mg) were inserted between two round (diameter 3 cm) transparent plastic sheets and sealed using a glue.

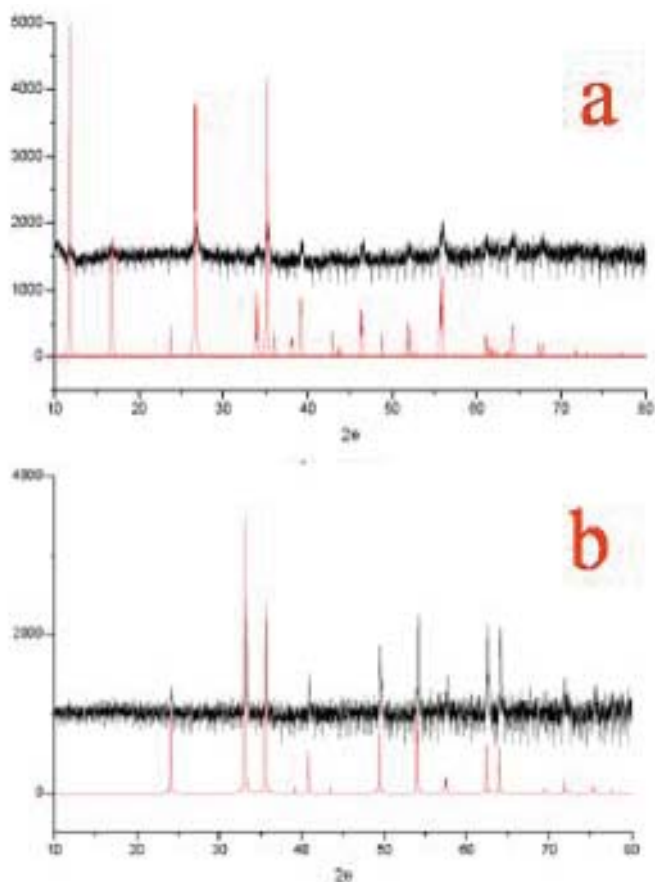


Fig. 2: Examples of XRD patterns for akaganeite and hematite crystalline structures. Shown are the XRD patterns obtained from sample S2 after 1 hour (a) and 7 days (b) of reactions, respectively. The pattern in red is the standard curve for akaganeite crystals (in (a)) and for hematite crystals (in (b)).

## 2. Additional TEM images

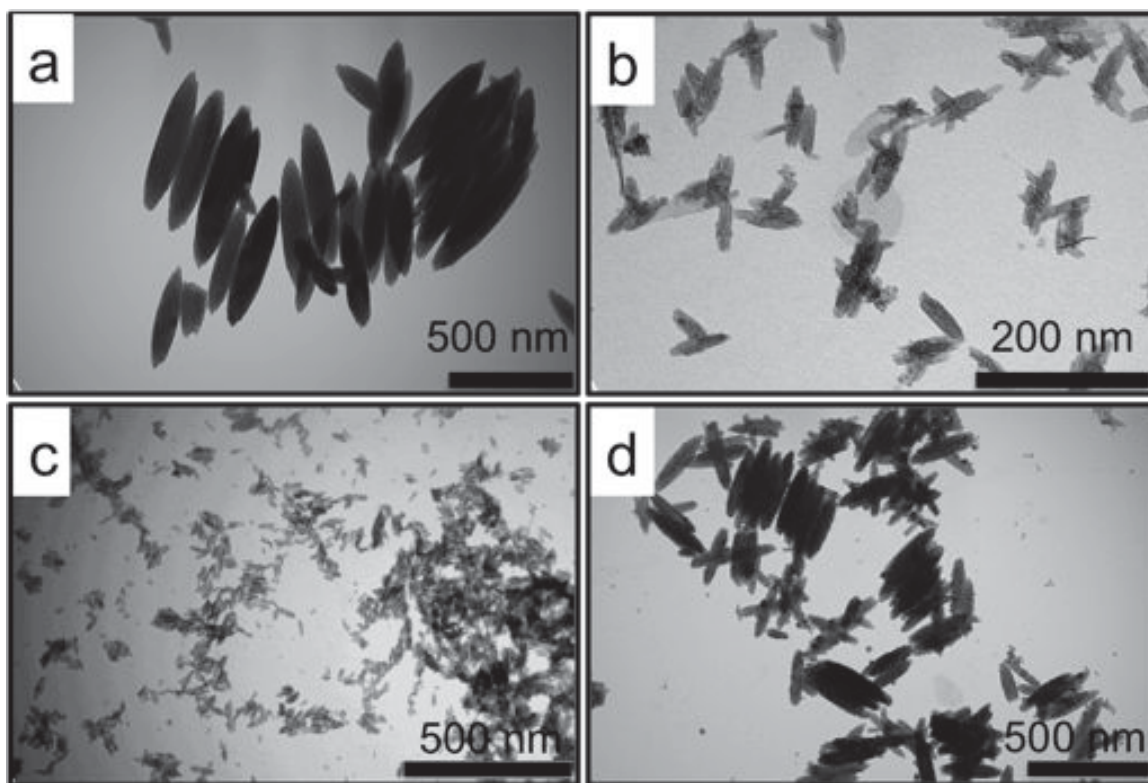


Fig. 3. Additional representative TEM images of akaganeite rods obtained after one hour of reaction in case of (a) S1 (b) S2 (c) S3 and (d) S4.

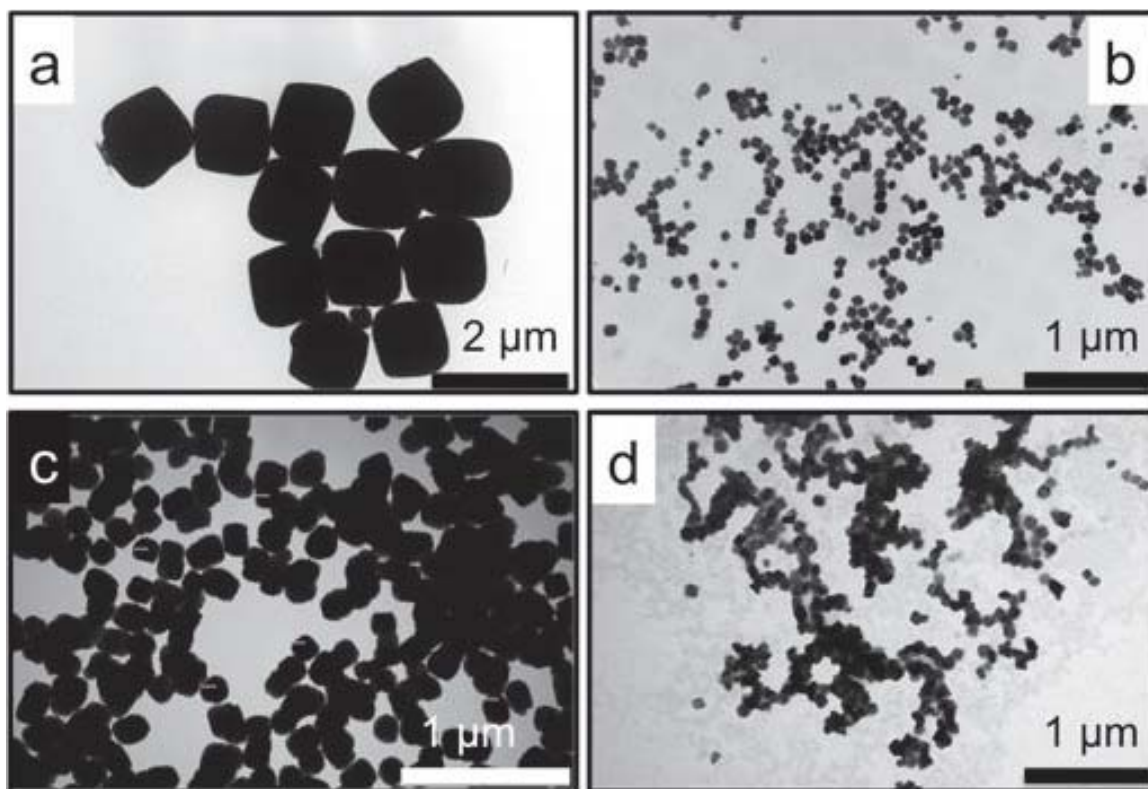


Fig. 4. Additional representative TEM images of hematite particles obtained after eight days of reaction in case of (a) S1 (b) S2 (c) S3 and (d) S4.