

Characterization of the Nano-Rod Arrays of Pyrite Thin Films Prepared by Aqueous Chemical Growth and Sulfurization

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As mentioned in the experimental and procedure section, the precursors become the final product after 3 steps. The product of these steps encoded respectively by X1, X2, and X3 (where X stands for G, F, or P):

Raw materials \rightarrow^1 X1 \rightarrow^2 X2 \rightarrow^3 X3

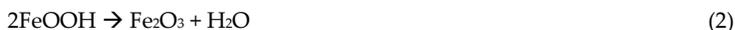
In this section, we will introduce the reactions of each step.

The first step is ACG process which includes hydration and deposition. In this step $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$, as precursor, participates in the following reaction in an aqueous solution:



As a result β -FeOOH in form of Nano-rods is deposited. This product is called X1.

The second step is calcination. In this step X1 specimens were tempered and experience the following reaction:



As the result, the Nano-rods' composition converts to α -Fe₂O₃ (Hematite). The product is called X2 at this step.

The final step is sulfurization. In this step X2 specimens were annealed in Sulfur containing atmosphere and the following reaction occurs:



As the result, Nano-rods' chemical composition change into FeS₂. These specimens are called X3. FeS₂ crystal phase in X3 specimens is composed of a mix of pyrite and Marcasite.