

Protocol for the synthesis of Cys-nFeS

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Method Article

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Abstract

To produce our target nanozyme with a narrow size distribution, solvothermal method was performed to composite iron sulfide at high temperatures and pressures. Here we describe the protocol for synthesizing Cys-nFeS.

Introduction

To produce inorganic polysulfide from organosulfur compound, solvothermal method was performed to prepare nano-iron sulfide at high temperature and pressure in a sealed autoclave reactor^{1,2}. Here we describe the protocol for synthesizing Cys-nFeS.

Reagents

ethylene glycol, FeCl₃·6H₂O, Sodium acetate (NaOAc), cysteine

Equipment

magnetic stirring bar, oven, Teflon-lined stainless steel autoclave

Procedure

- 0.82 g FeCl₃·6H₂O was dissolved uniformly in 40 mL ethylene glycol in a beaker.
- Keep stirring the mixture with a stir bar till it turned orange without distinct precipitation. CAUTION If the reactants added into the ethylene glycol cannot be dispersed easily, ultrasonic treatment on the mixture for 10 min or even longer would help.
- 3.6 g Sodium acetate was added into the mixture until the iron source was totally dissolved and the suspension became dark brown.
- Appropriate amount of cysteine were added into the mixture during the mixing process respectively.
- The mixture was transferred into a 50 mL Teflon-lined stainless steel autoclave in the fume cupboard after being sufficiently stirred and sonicated. CAUTION The screws of the stainless steel autoclave should be tightened for guaranteed pressure and safety.
- The reaction was conducted at 200°C in an oven for 12 h.
- After the reaction was finished, the Teflon-lined stainless steel autoclave was cooled to room temperature.
- The products in the Teflon-lined stainless steel autoclave was poured into a 50 mL centrifuge tube with the supernatant discarded.
- The products was dissolved in ethanol and washed for several times through centrifugal separation at 5000 g for 5 min until the washings became clear.
- The product of Cys-nFeS was obtained after drying at 60°C for 4 h, and then preserved at 4°C

Timing

14 h or longer (including the mixing process and the reaction time under high temperature and high pressure)

Anticipated Results

The new formed products are black powder which consist of hexagonal sheet-like nanostructures and sphere nanoparticles characterized by electron microscope.

References

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Figures

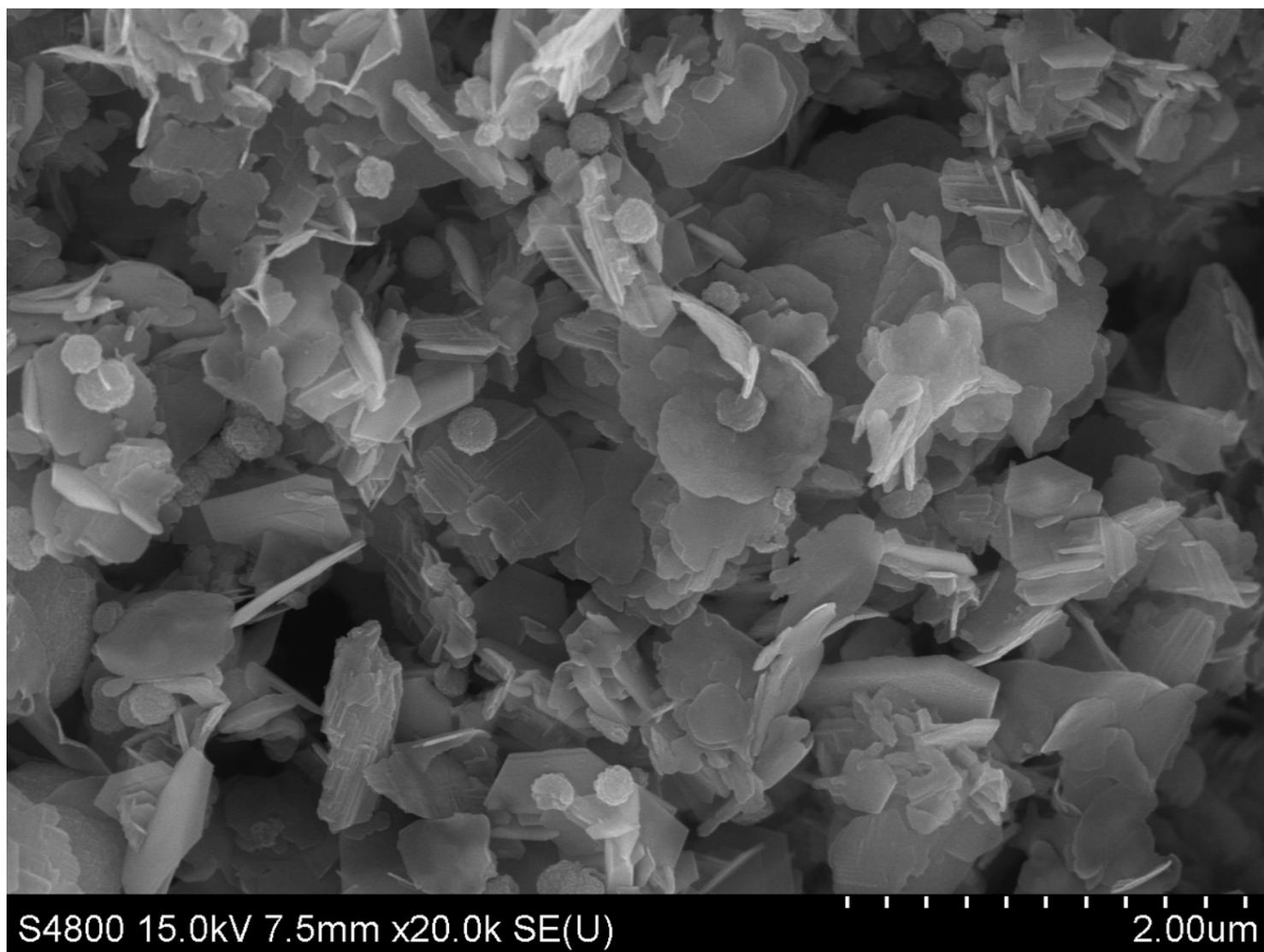


Figure 1

SEM image of Cys-nFeS SEM image of Cys~0.5~nFeS(the amount of input L-cysteine in solvothermal synthesis is 0.5 g)