



Preparation Method of Self-Assembly W18O49 Nanostructure CN 103570070 A

ABSTRACT

The invention provides a preparation method of a self-assembly W18O49 nanostructure. The preparation method is characterized by comprising the following steps: weighing WC16 and ZnCl₂; dissolving the WC16 and the ZnCl₂ into a mixed solvent of ethanol and polyethylene glycol 400; transferring into a reaction kettle, and reacting under the condition of 160-220 DEG C for 18-24 hours; centrifugalizing; carrying out solid-liquid separation; and washing to obtain a solid, namely the self-assembly W18O49 nanostructure. The preparation method provided by the invention can be used for preparing the self-assembly W18O49 nanostructure by taking a common precursor as a raw material and using a simple experiment device; the prepared self-assembly W18O49 nanostructure ranges from 700 micrometers to 1.4 micrometers on structural size and comprises nanometer bundles of 5-20 nanometers. The self-assembly W18O49 nanostructure provided by the invention can be well dispersed in water and achieves very high absorption in a near-infrared region; the prepared self-assembly W18O49 nanostructure is expected to be used for the fields of photoelectricity, nano-biology and the like.

DESCRIPTION

Kind of self-assembled nanostructures preparation W18O49

Technical Field

The present invention belongs to the field of nano material preparation, particularly, to a self-assembly method stomach 18049 nano structures.

Background

The self-assembled nano structures are nano-materials for optical applications, optoelectronic applications - important prerequisite. Self-assembled nanostructures with respect to the single - nanostructure has a more excellent properties (J.Am.Chem.Soc.2011,133,15946). As - tungsten oxide species important semiconductor material, in many areas has been widely used, it has been of great concern. For example, oxidation crane (W03_x) nano-materials have been used with the gas sensor (Adv.Funct.Mater.2008,18,1922), electrochromic window (Chem.Eur.J.2011,17,5145), photocatalysis (Small2008 , 4,1813), photothermal treatment of cancer (Adv.Mater.2013,25,2095). Currently reported W03_x nanostructures mainly nanowires and nanorods, and self-assembled nanostructures W18O49 been reported.

The present invention is a common precursor in the synthesis of low-cost assembly W18O49 nanostructures. No simple equipment requirements. Product defects due to the presence of oxygen in the near-infrared region has a strong absorption.



DISCLOSURE

The object of the present invention is to provide a low-cost - kinds of commonly used synthetic precursor W18O49 nanostructure self-assembly method.

To achieve the above objects, the present invention provides a method of self-assembled nano W18O49 structure, characterized in that the specific steps include: Weigh WCl₆ and ZnCl₂, which was dissolved to mixing alcohol and polyethylene glycol 400 solvents, transferred to the reaction dad, in the 160-220 ° C reaction conditions 18-24h, centrifugation, solid-liquid separation, washing the resulting solid paint to give self-assembled nanostructures W18O49.

Preferably, the molar ratio of said WCl₆ and ZnCl₂ as 1: 0.3-0.9.

Preferably, the mixed solvent of the alcohol and polyethylene glycol 400 in a volume ratio to polyethylene glycol 400 is 1: 0.25.

Compared with the prior art, the beneficial effects of the present invention are:

1, the present invention is a common precursor for raw materials, with a simple experimental device can be prepared self-assembled nanostructures W18O49; preparation of self-assembled nanostructures W18O49 700-1.4μm size within the range from 5-20nm nano-bundles. Can be well dispersed in water the self-assembled structures in the near infrared region has a strong absorption. W18O49 self-assembled nanostructures could be used for the preparation of optical, nano-biotechnology and other fields.

2, the process used for the preparation process of the present invention is simple, cheap and readily available raw materials, high repetition rate.

Brief Description

Figure 1 is a self-assembling stomach invention prepared 18049 nm low-fold structure, high magnification SEM images and high resolution transmission diagram;

FIG. 2 of the present invention prepared in the self-assembly of nano-XRD W18O49 image structure;

FIG. 3 of the present invention prepared in the self-assembly of nano W18O49 absorption spectrum structure; DETAILED DESCRIPTION

In order that the invention may be more fully understood, hereby to a preferred embodiment, described in detail below.



Example 1

Weigh 0.1980g WCl_6 , 0.0245g $ZnCl_2$, dissolved in 40mL to 10mL alcohol solvent mixture of polyethylene glycol 400, transferred to 60mL volume of reactor, under reaction conditions 180 ° C 24h, centrifuged, The supernatant was discarded, the resulting solid was washed, to give a blue product, i.e. W18O49 self-assembled nanostructures. Figure 1a, 1b description prepared by the W18O49 5-20nm nanowire bundle of assembled. Figure 1c shows that the self-assembled structure along the (010) direction of growth, and Figure 2, respectively. 3 for the structure of a UV - visible absorption spectrum, indicating that the self-assembled structures have a strong near-infrared absorption, could be used for light and heat treatment.

Example 2

Weigh 0.1980g WCl_6 , 0.0245g $ZnCl_2$, soluble in alcohol and 20mL 30mL to mixed solvent of polyethylene glycol 400, transferred to 60mL volume of reactor, the reaction conditions at 180 ° C 24h. Centrifugation, the supernatant was discarded, the resulting solid was washed, to give a blue product, i.e. W18O49 self-assembled nanostructures.

Example 3

Weigh 0.3960g WCl_6 , 0.0490g $ZnCl_2$, dissolved in 40mL to 10mL alcohol solvent mixture of polyethylene glycol 400, transferred to 60mL volume of reactor, the reaction conditions at 180 ° C 24h. Centrifugation, the supernatant was discarded, the resulting solid was washed, to give a blue product, i.e. W18O49 self-assembled nanostructures.

Example 4

Weigh 0.1980g WCl_6 , 0.0245g $ZnCl_2$, soluble in alcohol and 20mL 30mL to mixed solvent of polyethylene glycol 400, transferred to 60mL volume of reactor, the reaction conditions at 180 ° C 12h. Centrifugation, the supernatant was discarded, the resulting solid was washed, to give a blue product, i.e. W18O49 self-assembled nanostructures.