Poster

DIRECT SYNTHESIS OF SIC NANORODS BY ANNEALING CARBON NANOCAPSULES AND SiO_2 SPHERES

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Silicon carbide nanorods (SiC NRs) exhibit excellent properties for unique mechanical and optical properties in the applications of cold cathode field emission display (FED), nanodevices and sensors [1-2]. Various carbon precursors, such as activated carbon fibers [3], platelet carbon nanofibers (PCNF) [4] and graphite powders [5], have been fabricated SiC NWs successfully. In this study, a new carbon precursor to prepare SiC NRs is reported.

A mixture of carbon nanocapsules and SiO_2 sphere powders in a weight ratio of 1:1 was mixed for 60 min at room temperature (Fig. 1a and 1b) [6]. The mixture powders were loaded an alumina boat with cap and placed in the middle of a horizontal tube furnace. SiC NRs were synthesized through mixture powders under an argon atmosphere at 1300 ^{o}C for 8 hours. The observation of the as-synthesized SiC NRs using field-emission scanning electron showed that the diameter of the nanowires was about 20-90 nm and the length was up to several micrometers (Fig 2). The surface of SiC NRs revealed zigzag structure. In the conventional transmission electron microscopy image and selected area electron diffraction (SAED) shown in Fig. 3, the SiC NR is single-crystalline structure with lattice fringes perpendicular to the nanorod axis and possesses a high density of stacking fault. The SAED pattern (inset of Fig. 3) demonstrates that SiC NRs has a single and continuous crystalline phase. The lattice spacing of 0.25 nm corresponded to the d-spacing of <111> crystal plane of the β-SiC.

References:

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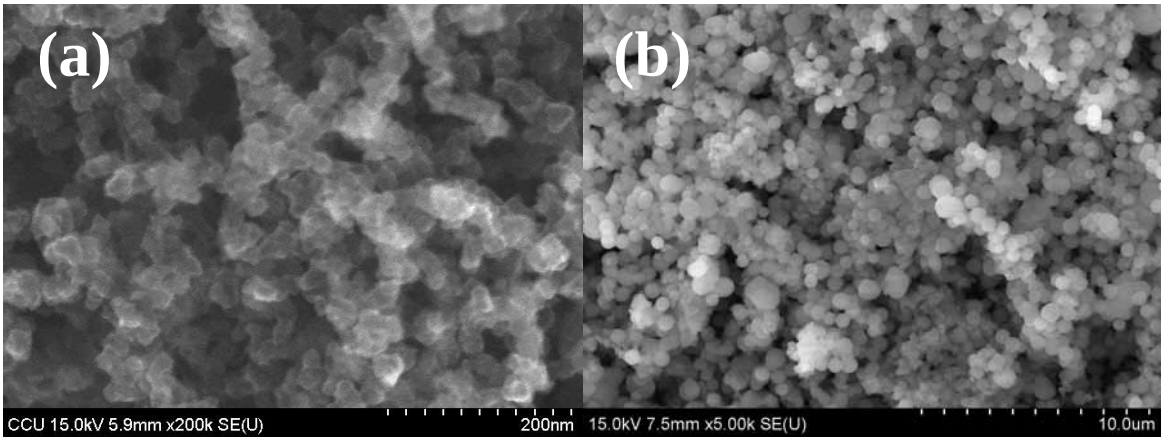
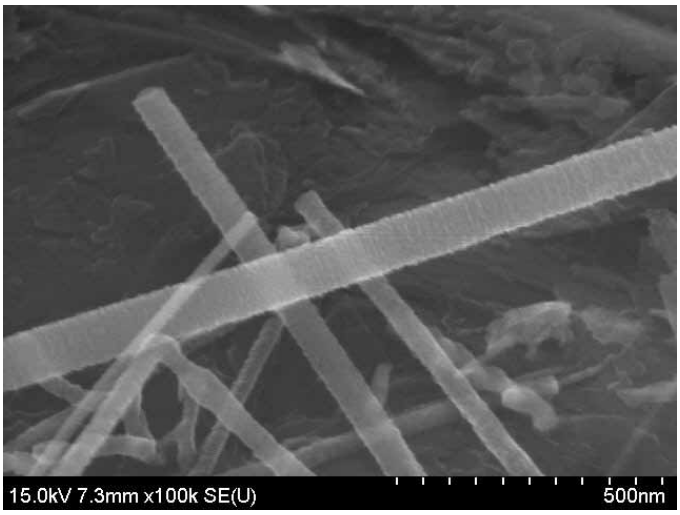
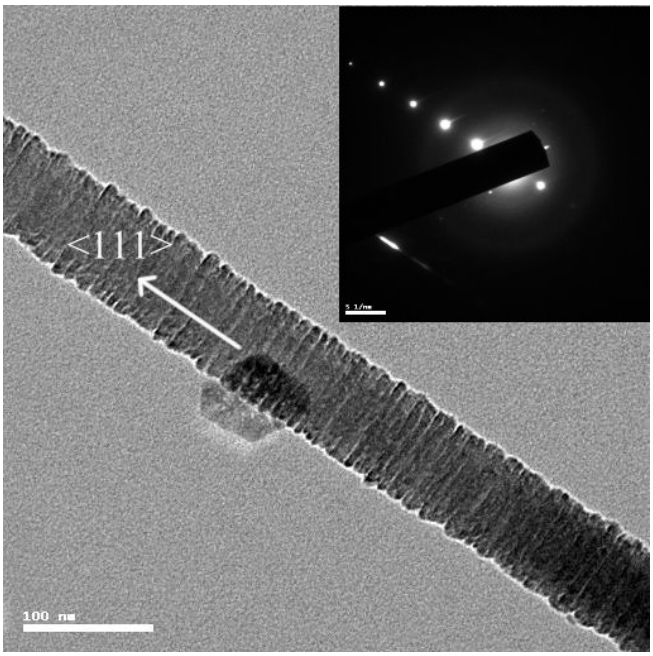
Figures:



Figrue1. SEM of as-synthesized (a) carbon nanocapusles and (b) SiO_2 spheres



Figrue2. High magnification SEM of SiC nanorods



Figrue3. TEM image of SiC nanorod. Inset shows a SAED pattern of SiC nanorod.