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W₁₈O₄₉ nanorods: Controlled preparation, structural refinement, and electric conductivity

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ABSTRACT

This paper reports on the controlled synthesis of W₁₈O₄₉ nanorods using pyrolysis-reduction process through tuning both H₂ gas flow and heating temperature. The results suggest that W₁₈O₄₉ nanorods will grow well when calcined at 650 °C for 2 h at 10 l/h H₂ gas flow rate. Using GSAS software the fitted lattice parameters of obtained W₁₈O₄₉ are given, that is, a: 18.340 Å, b: 3.788 Å, c: 14.025 Å, β: 115.168°, by the Rietveld refining X-ray diffraction pattern. The result of sheet resistance measurement of samples indicates that pure W₁₈O₄₉ nanorods exhibit a resistivity as low as 0.068 Ω·cm.

Keywords: W₁₈O₄₉ nanorods; Controlled preparation; Refinement; Electric conductivity

1. Introduction

W₁₈O₄₉ with a monoclinic structure (P2/m) consists of the distorted WO₆ octahedra interconnecting in a corner-sharing way, which makes W₁₈O₄₉ readily form one-dimensional (1D) topography [1]. W₁₈O₄₉ is n-type semiconductor with a band gap (E_g) of 2.6 ~ 2.8 eV [2].

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