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The effect of La^{3+} ion doping on the crystallographic, optical and electronic properties of CuO nanorods

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Abstract

We have synthesized one-dimensional (1D) $\text{Cu}_{100-x}\text{La}_x\text{O}$ nanorods (NRs) by Co-precipitation method. The crystallographic phase, and morphology are analyzed using XRD, micro-Raman, XPS and TEM. The length and diameter of the $\text{Cu}_{100-x}\text{La}_x\text{O}$ NRs ($x=0.0, 0.5, 1.0$) are ~250-300 and 22-25nm. The effect of La^{3+} ion doping on the optical properties have been analyzed using diffused reflectance spectroscopy. The strategy of utilizing La^{3+} ion as dopant for CuO worked out positively, as evidenced by impedance spectroscopy study. Our work provides valuable insights into the design and utilization of 1D $\text{Cu}_{100-x}\text{La}_x\text{O}$ NRs for practical application in optoelectronics.

Keywords: Co-precipitation; Structural; Spectroscopy; Grain boundaries.

1. Introduction

Recently, the fabrication of one-dimensional (1D) CuO nanorods (NRs) has received extensive attention and huge potential have been predicted in wide-range of applications such as solar cell, gas sensor, photocatalysis etc [1]. But the poor hole mobility and electrical conduction of CuO NRs limits its applications for the same [2,3]. However, the large-scale synthesis of CuO NRs is hard to achieve by some of reported methods [4]. Moreover, electrical properties can remarkably

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