# Preparation of Zinc Oxide Nanostructures by Thermal Oxidation of Zinc:Zinc Oxide:Carbon Mixtures

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## ABSTRACT

***Zinc oxide nanostructures were prepared by thermal oxidation of zinc, zinc oxide and carbon mixtures. The mixture was screened on the alumina substrate and heated at 800°C for 1 hour under normal atmosphere. The influence of the mixture ratio on the formation of nanostructure was investigated with field emission scanning electron microscope and an energy dispersive spectroscope. It was found that the size of nanostructures depended on the ratio of the mixture. The higher ZnO:Zn ratio led to the formation of shorter, and less density of nanostructure. However, there was a number ratios with carbon that could form long and high density of nanostructure.***

**Key words:** Zinc oxide, Nanostructure, Nanowire, Nanobelt

## INTRODUCTION

Zinc oxide is a metal oxide wide-band gap semiconductor (Christoulakis et al., 2006) which has been widely studied. These include the fabrication of nanodevices (Wang et al., 2006) and various applications, such as gas sensors (Nanto et al., 1996), piezoelectric devices (Gardeniers et al., 1998), varistors (Miguel et al., 2006), planar optical waveguides (Wenas et al., 1991), transparent electrodes (Kim et al., 1997), ultraviolet photodetectors, surface acoustic wave devices. Zinc oxide nanostructures could be synthesized by several techniques such as vapor deposition, sputtering, pulsed laser deposition (PLD), oxidation and screen printing (silk screen). Screen printing has been developed in the fields of microelectronics for hybrid and integrated circuit manufactures (Miguel et al., 2006) and this technique is well known as one of most important thick film deposition methods (Ivanov, 2004). The advantages of this method are simple, low cost, fast and high reproducibility.

In this work, zinc oxide nanostructures were synthesized by thermal oxidation using screen printing of zinc, zinc oxide and carbon mixtures. The effect of the mixture ratio on the formation of nanostructures was investigated.