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Synthesis and field emission properties of nickel oxide nanoplatelets prepared by simple novel technique

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ABSTRACT

Single crystalline NiO nanoplatelets were successfully synthesized by new facile method at 200 °C. The morphology and microstructure were determined by X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD measurement indicated that the prepared sample had typical cubic structures. The SEM investigation confirmed that the product was of the form of nanoplatelets. These nanoplatelets have average width length 250 nm and thickness of 20 nm. The field emission measurements demonstrate that the NiO nanoplatelets show a promising field emission property. The improved field emission is attributed to the local field enhancement factor at the nanoplatelets. The results confirm the importance of the morphology of nanomaterial in field emission.

1. Introduction

The reduction in particle size to nanometer scale results in fascinating properties compared with their bulk properties [1]. Metal oxide nanomaterials exhibit promising characteristics over conventional materials in many applications. Nickel oxide nanoparticles have exhibited unique properties such as catalytic [2], magnetic [3], electrochromic [4], electrochemical supercapacitors [5], and dye sensitized photo-cathodes [6]. Different strategies have been proposed for synthesis and manufacturing of nickel oxide with different shapes and structures, such as thermal evaporation [7], sputtering [8,9], electrochemical deposition [10], chemical vapor deposition [11] and sol–gel techniques [12]. Hydrothermal synthesis has some advantages such as low cost, high purity and facile rout for industrial applications [13].

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