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Efficient multi-coloured Li-doped ZnO thin films fabricated by spray pyrolysis

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ABSTRACT

Undoped and Li-doped ZnO films with bright visible luminescence have been fabricated by the spray pyrolysis technique at 400°C. The pyrolytic films exhibit multi-coloured emissions of yellow, green and blue, which can be tuned by varying the Li concentration. Simulation of the cathodoluminescence spectra from the Li-doped films using the Huang-Rhys model reveals the energies of the luminescence centres and their electron-phonon coupling strength. These centres are attributable to either V_{Zn} or Li_{Zn} acceptor states. This work presents a practical route to fabricate inexpensive multi-coloured light emitting coatings on any substrate.

Keywords: ZnO films; Li dopants; luminescence properties; spray pyrolysis

1. Introduction

The current interest in developing luminescence materials for flat panel displays has driven considerable research activities in the field. This effort has relied on different types of materials as hosts for dopants employed as luminescence centres in electroluminescence devices [1, 2]. ZnO is a versatile material with applications include transparent electrodes in photovoltaic cells [3], chemical sensing [4], electroluminescence devices [5]. Several techniques suitable for fabrication of small as well as large area, functional ZnO films, such as pulsed laser deposition

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