

Accepted Manuscript

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PII: S1293-2558(18)30343-1

DOI: 10.1016/j.solidstatesciences.2018.04.005

Reference: SSSCIE 5675

To appear in: *Solid State Sciences*

Received Date: 26 March 2018

Accepted Date: 10 April 2018

Please cite this article as: Yuncheng Zhou, Peng Jiang, Jianlei Kuang, Xueshan Yang, Wenbin Cao, Rapid microwave assisted synthesis of $\text{YIn}_{1-x}\text{Mn}_x\text{O}_3$ blue pigments: synthesis, microstructure and optical properties, *Solid State Sciences* (2018), doi: 10.1016/j.solidstatesciences.2018.04.005

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Rapid microwave assisted synthesis of $\text{YIn}_{1-x}\text{Mn}_x\text{O}_3$ blue pigments: synthesis, microstructure and optical properties

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Abstract

The $\text{YIn}_{1-x}\text{Mn}_x\text{O}_3$ ($0.1 \leq x \leq 0.5$) blue pigment samples are successfully prepared through a sol-gel process followed by microwave assisted sintering process. All the samples are shown single phases in the X-ray diffraction results. In the morphology study from scanning electronic microscope, the samples are composed of loosely connected small particles. The oxidation state of Mn is confirmed to be 3+ from the results of X-ray photonelectronic scan. The optical properties are characterized by UV-Visible spectrum and UV-visible-NIR spectrum. The samples exhibit intense blue color and they show small absorption in infrared region.

Key words: microwave synthesis; blue pigments; low infrared absorption; X-ray photonelectronic scan

Introduction

The solid solution of $\text{YIn}_{1-x}\text{Mn}_x\text{O}_3$ ($0.1 \leq x \leq 0.5$) has raised great research focus since its discovery due to its intense blue color [1]. It may be applied for new blue inorganic pigment for its intense color, high temperature endurance and prolonged working lifetime. Moreover, recent study reveals that it reflects a majority of infrared radiation which generates heat, from the sunlight [2]. Therefore, the new blue chromophore will help to cool the construction and is regarded as an environmental friendly pigment. With these reasons, it arises great research interest since its first report.

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