VOLUME - VIII, ISSUE - I- JANUARY - MARCH - 2019
AJANTA - ISSN 2277 - 5730 -IMPACT FACTOR - 5.5 (www.sjifactor.com)

16. Photoluminescence Properties of Eu3+ Doped NaMg3Al (MoO4)5 Red Phosphors

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Abstract

A simple combustion synthesis of $NaMg_3Al(MoO_4)_5:Eu^{3+}$ phosphors is described. Photoluminescence characterization of prepared phosphors is carried out. Intense red emission for $NaMg_3Al_{1-x}(MoO_4)_5:xEu^{3+}$ (x=7%) phosphor is observed peaking at 617 nm when excited by UV light, whereas, maximum PL intensity is observed for $NaMg_3Al_{1-x}(MoO_4)_5:xEu^{3+}$ (x=7%) phosphor annealed at 750^0C centered around 594 nm and 617 nm upon excited by 290 UV radiations. The emission intensity of Eu^{3+} ions in the $NaMg_3Al(MoO_4)_5$ host largely enhanced with the concentration increasing of activator (Eu^{3+}). Intense characteristic emissions show no concentration quenching up to 5 mol% concentration of rare earth ion and the emission intensity reached the maximum at x=7%. The optical properties of this material lead us to state that it may serve as a promising material for use as lamp phosphor in the red region

1. Introduction

Molybdates have found many applications, for example as catalysts, laser materials, solid-state electrolytes [1–5]. Recently, a new group of ternary molybdates with general formula $NaM^{II}_3M^{III}(MoO_4)_5$, where M^{II} = Mg, Ni, Co, Mn, Fe; M^{III} = Al, In, Fe, Cr; has drawn attention since these molybdates may find application as solid-state electrolytes with sodium cation conductivity [6–8]. The iron containing molybdates are also suitable model systems for magnetic interactions because in this structure FeO_6 octahedra are separated from each other by MoO_4