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Preparation and luminescence of Ce: YAG transparent glass ceramics by liquid-phase sintering

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Abstract

A Ce:YAG transparent glass ceramic was prepared by liquid-phase sintering of a mixture of YAG-Al₂O₃-PbO-PbF₂-B₂O₃ precursor glass with Ce:YAG nanocrystals. The microstructure, luminescence spectra and lifetime behaviors of the sample was investigated. The size of the YAG crystals inside the GC reached ~20 μm. The average in-line transmittance (2-mm thick) of the GC was more than 56% in the visible region. The GC exhibited a broad yellow emission band, long lifetime ($\tau = 1.69 \mu\text{s}$), good transparency, and low sintering temperature, implying that the composite is a promising candidate for high-power white light emitting diodes (WLEDs).

Keywords: Nanocomposites; Optical materials and properties; liquid-phase sintering

1 Introduction

Ce:YAG single crystals exhibit a high potential for applications such as LEDs, monitors, and scintillation materials because of their excellent optical and thermal performances [1, 2]. However, the strict requirements for fabricating large, homogeneously doped, high-quality

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