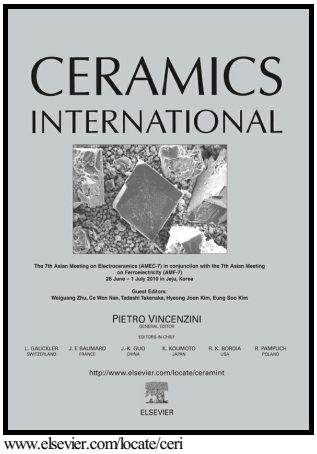


www.elsevier.com/locate/ceri

# Photoluminescence, Energy Transfer, and Thermal Stability of $BaAl_2Si_2O_8:Bi^{3+}$, $Tb^{3+}$ Phosphors for w-LEDs

Pingchuan Ma, Yanhua Song, Bo Yuan, Ye Sheng, Chengyi Xu, Haifeng Zou, Keyan Zheng

PII: S0272-8842(16)31481-X
DOI: http://dx.doi.org/10.1016/j.ceramint.2016.08.161
Reference: CERI13613

To appear in: *Ceramics International*

Received date: 21 June 2016
Revised date: 23 August 2016
Accepted date: 25 August 2016

Cite this article as: Pingchuan Ma, Yanhua Song, Bo Yuan, Ye Sheng, Chengyi Xu, Haifeng Zou and Keyan Zheng, Photoluminescence, Energy Transfer, and Thermal Stability of $BaAl_2Si_2O_8:Bi^{3+}$, $Tb^{3+}$ Phosphors for w-LEDs, *Ceramics International,* http://dx.doi.org/10.1016/j.ceramint.2016.08.161

# Photoluminescence, Energy Transfer, and Thermal Stability of $BaAl_2Si_2O_8:Bi^{3+}$, $Tb^{3+}$ Phosphors for w-LEDs

Pingchuan Ma, Yanhua Song, Bo Yuan, Ye Sheng, Chengyi Xu, Haifeng Zou*, Keyan Zheng*

College of Chemistry, Jilin University, Changchun 130012, PR China

E-mail address: zouhf@jlu.edu.cn (H. Zou);

zhky@jlu.edu.cn (K Zheng).

## Abstract

A series of $Tb^{3+}$ or/and $Bi^{3+}$ doped $BaAl_2Si_2O_8$ phosphors were synthesized via solid-state method. The structure, luminescence properties and thermal stability were investigated. The optimum concentrations of $Bi^{3+}$ and $Tb^{3+}$ were 1.5mol% and 7mol%, respectively. Furthermore, $BaAl_2Si_2O_8$:0.015$Bi^{3+}$ and $BaAl_2Si_2O_8$:0.07$Tb^{3+}$ phosphors emitted blue and green light and the emission color of $BaAl_2Si_2O_8:Bi^{3+}$, $Tb^{3+}$ could be tuned from blue to green through the energy transfer. This energy transfer from $Bi^{3+}$ to $Tb^{3+}$ was confirmed and investigated by photoluminescence spectrum and decay lifetime. With constantly increasing $Tb^{3+}$ concentrations, the energy transfer efficiency from $Bi^{3+}$ to $Tb^{3+}$ in $BaAl_2Si_2O_8$ host increased gradually and reached as high as 86.54%, the quantum yield was about 44.26%. The energy transfer mechanism ($Bi^{3+}$-$Tb^{3+}$) was proved to be dipole−dipole mechanism. The $Tb^{3+}$ emission intensity can be considerably enhanced when monitored at NUV (377 nm) by co-doping $Bi^{3+}$ ion. Moreover, the phosphor of $BaAl_2Si_2O_8$: 0.015$Bi^{3+}$, 0.07$Tb^{3+}$ could exhibited strong green emission with good CIE chromaticity coordinate. The results indicate that $BaAl_2Si_2O_8:Tb^{3+}$, $Bi^{3+}$