



Contribution ID: 311

Type: **Poster Presentation**

Persistent luminescence excitation of BaAl₂O₄:Eu²⁺,Dy³⁺

Tuesday, 26 June 2018 15:00 (2 hours)

BaAl₂O₄:Eu²⁺,Dy³⁺ is the heaviest but the least efficient persistent luminescent material in the MAl₂O₄:Eu²⁺,R³⁺ series. Low efficiency may be due to the hygroscopic host material and/or polymorphic crystal structure [1]. Both may deteriorate the persistent excitation and emission through a change in the trap structure thus shortening the persistent duration. Charging of BaAl₂O₄:Eu²⁺,Dy³⁺ is rather slow, a steady state was achieved only after 30 s. Deconvolution of the thermoluminescence (TL) curves yielded a single trap with a depth of 0.8 eV after UV irradiation. Results agree well with studies on BaAl₂O₄:Eu²⁺,Dy³⁺ prepared with solid state and combustion methods [2]. 3D persistent excitation spectroscopy used in this study gives more detailed information than the simple TL measurements. The irradiation of BaAl₂O₄:Eu²⁺,Dy³⁺ with 200 to 500 nm UV-vis radiation has no effect on the shape of the TL glow curves consisting of a single band at 57 °C. The excitation spectra show little fine structure: at least two bands at 280 and 330 nm (max) with a shoulder at 380 nm. This structure may be due to the splitting of the 2D excited level of Eu²⁺. The use of free solar energy for excitation is thus limited. The 3D TL emission spectra show only one broad band at 500 nm despite two Ba²⁺ sites. The BaAl₂O₄:Eu²⁺,Dy³⁺ materials are interesting persistent phosphors though UV excitation is required. The shallow trap at 0.8 eV yields weak and short persistent luminescence at room temperature, as well. A stable crystal structure would be an advantage, too.

References

- [1] J. Hölsä, H.C. Swart, L.C.V. Rodrigues, H.F. Brito, M. Lahtinen, M. Lastusaari, ESTAC-11, Aug. 17-21, 2014, Espoo, Finland.
- [2] L.C.V. Rodrigues, R. Stefani, H.F. Brito, M.C.F.C. Felinto, J. Hölsä, M. Lastusaari, T. Laamanen, M. Malkamäki, J. Solid State Chem. 183 (2010) 2365.

Please confirm that you have carefully read the abstract submission instructions under the menu item "Call for Abstracts" (Yes / No)

yes

Consideration for student awards Choose one option from those below.
N/A Hons MSc PhD

n/a

Supervisor details If not a student, type N/A. Student abstract submission requires supervisor permission: please give their name, institution and email address.

n/a

Primary author: Prof. HÖLSÄ, Jorma (University of Turku)

Co-authors: Prof. BOS, Adrie J.J. (Delft University of Technology); Prof. SWART, Hendrik (University of the Free State); Prof. RODRIGUES, Lucas C.V. (University of São Paulo); Prof. MALKAMÄKI, Marja (University of Turku); Prof. LASTUSAARI, Mika (University of Turku); Prof. DORENBOS, Pieter (TU Delft)

Presenter: Prof. SWART, Hendrik (University of the Free State)

Session Classification: Poster Session 1

Track Classification: Track A - Physics of Condensed Matter and Materials