Contribution ID: **260** Type: **Oral Presentation**

Thermoluminescence from semiconductor quantum dots

Thursday, 2 July 2015 15:20 (20 minutes)

Abstract content
   (Max 300 words)
Formatting &
Special chars

The TL from different materials has been studied by many research groups. The simplest possible model that has been used to describe the process by which materials emit the light when heated consists of two localized levels: an isolated electron trap and a recombination center. This approach is commonly called one-trap-one-recombination center (OTOR) model. The interactive-multi-trap-system (IMTS) model has also been used. It assumes that there is one active electron trap; one thermally disconnected deep trap that cannot be thermally activated, and one recombination center. Basically, in an experiment we often have more than one active electron traps taking part in TL process. In this paper, the second order kinetics describing the thermoluminescence from semiconductor quantum dots consisting two active electron trap levels and one recombination center model is proposed. The two trap levels are located at different trap depths beneath the conduction band. The rate equations corresponding to each trap level allow us to numerically simulate the variation of the concentration of electrons in both traps and the thermoluminescence intensity as a function of temperature for the semiconductor quantum dots of diameter 2-8nm. It is shown that the intensity increases with decreasing in the dot size indicating that the quantum confinement effect enhances the band to band radiative recombination rate. The two peaks of the intensity correspond to the two different active electron trap levels. With an increase in the dot size of the deeper trap, the peaks of intensity shift to the high temperature region.

Apply to be
 considered for a student
   award (Yes / No)?

yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Main supervisor (name and email)
and his / her institution

Dejene BF

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Mr DEBELO, Nebiyu Gemechu (University of the Free State (Qwaqwa Campus),)

Co-authors: Dr MESFIN, Belayneh (Addis Ababa University); Prof. DEJENE, Francis (University of the Free State); Dr KITTESA RORO, Kittesa Roro (R&D (Energy Initiatives) CSIR); Dr SENBETA, Teshome (Addis Ababa University); MAL'NEV, V. N. (Addis Ababa University)

Presenter: Prof. DEJENE, Francis (University of the Free State)

Session Classification: TCP

Track Classification: Track G - Theoretical and Computational Physics