



Contribution ID: 15

Type: Oral Presentation

A scheme to analyze the decay time of rare earth ions using a square wave technique

Wednesday, 27 June 2018 15:40 (20 minutes)

Three samples $\text{La}_2\text{O}_3:\text{Er}^{3+}/\text{Yb}^{3+}$ (LEY), $\text{La}_2\text{O}_3:\text{Ho}^{3+}/\text{Yb}^{3+}$ (LHY) and $\text{La}_2\text{O}_3:\text{Er}^{3+}$ (LE) were synthesized via the combustion method. Urea was used as a fuel and reducing agent. The samples were annealed at 800 °C for 4 hours in order to get good crystallization. The phase confirmation of the samples was carried out by using X-ray diffraction analysis. Surface morphology of the sample was done by field emission scanning electron microscopy analysis with spherical particles. Fourier transformed infra-red transmittance of the samples was done in order to investigate the impurities. The annealed samples (800 °C) were further used for optical measurements. Upconversion emission of all the samples were measured and three prominent bands were monitored at 522, 548 and 662 nm corresponding to $2\text{H}_{11/2} \rightarrow 4\text{I}_{15/2}$, $4\text{S}_{3/2} \rightarrow 4\text{I}_{15/2}$ and $4\text{F}_{9/2} \rightarrow 4\text{I}_{15/2}$, manifolds, respectively. The decay time measurements were done using a monochromator coupled with a Cathode ray oscilloscope (CRO). A continuous laser beam (976 nm) was chopped using a mechanical chopper (1000 Hz). Thus the data acquired by using the CRO was plotted as a square wave and this wave was further used to analyze the decay time with fixing different fitting parameters. This technique of decay time measurements is very inexpensive and easy handled. Thus the calculated decay time of the samples were found to be 252 ms, 102 ms and 54 ms, for LEY, LHY and LE, respectively.

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

PhD

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

Prof H C Swart

Primary author: Dr TIWARI, S P (Department of Physics University of Free State)

Co-author: Prof. SWART, Hendrik (University of the Free State)

Presenter: Dr TIWARI, S P (Department of Physics University of Free State)

Session Classification: Applied Physics

Track Classification: Track F - Applied Physics