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## Synthesis and characterization of a narrowband $\text{Ca}_5(\text{PO}_4)_3(\text{OH})\text{:Gd}^{3+}\text{Pr}^{3+}$ phosphor for medical applications

Tuesday, 10 July 2012 17:30 (2 hours)

### Abstract content <br> &nbsp; (Max 300 words)

Hydroxylapatite ( $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ ) is a well-known bioceramic material for medical application because of its ability to form a chemical bond with bones. Due to the better osteoconductivity, synthetic hydroxylapatite is considered to be an ideal material as a bone substitute. In this study, we investigate the luminescent properties of ( $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ ) co-doped with Gadolinium ( $\text{Gd}^{3+}$ ) and Praseodymium ( $\text{Pr}^{3+}$ ) synthesized using a wet chemistry method. The dried and calcined  $\text{Ca}_5(\text{PO}_4)_3(\text{OH})\text{:Gd}^{3+}\text{Pr}^{3+}$  phosphor was characterized using X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and Photoluminescence (PL) spectroscopy. The XRD patterns showed a single hexagonal ( $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ ) phase. The diffraction peaks became narrower with an increase in the calcination temperature from 700 °C to 900 °C indicating an increase in the degree of crystallinity. Photoluminescence excitation measurements showed that the phosphor can be efficiently excited by 221 nm UV light. The PL emission spectrum consisted of two narrow bands with a major emission at 316 nm and a minor emission at 630 nm, which correspond to radiative transitions in  $\text{Gd}^{3+}$  and  $\text{Pr}^{3+}$  respectively. The  $\text{Ca}_5(\text{PO}_4)_3(\text{OH})\text{:Gd}^{3+}\text{Pr}^{3+}$  phosphor is evaluated for a possible application as a light source in phototherapy lamps.

### Apply to be<br> consider for a student <br> &nbsp; award (Yes / No)?

Yes

### Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD)?

M.Sc

### Main supervisor (name and email)<br>and his / her institution

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

Yes

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