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## Thermoluminescence investigations in $K_3Ca_2(SO_4)_3F:Dy$ phosphor

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**Abstract content**   
 (Max 300 words)   
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There is an increasing demand for dosimetry of heavy ion beams as they are increasingly used for diagnostic and therapeutic purposes. The tumors and cancer close to sensitive tissues can be cured by this technique without any surgical operation. Therefore, there is a great demand of measuring doses/ fluences of such energetic particles with great precision and accuracy, especially, while dealing with human beings. Thermoluminescent dosimetry (TLD) phosphors can be best employed for this purpose, since TLD materials are used from the last five decades for measuring the fraction of radiations such as  $\gamma$ -rays,  $\beta$ -rays etc. present in environment or for the amount of radiation dose delivered to the patient during radiation treatment.  $K_3Ca_2(SO_4)_3F:Dy$  phosphor was prepared by co-precipitation method and a thermoluminescence (TL) study was carried out in detail. For TL study the prepared phosphor was irradiated by  $\gamma$ -rays from  $^{60}Co$  and a carbon ( $C^{5+}$ ) beam. The  $\gamma$ -rays irradiated sample possesses TL glow peaks at  $107^\circ C$  and  $293^\circ C$ , whereas those irradiated with carbon ion have glow peaks at  $126^\circ C$  and  $343^\circ C$ . In the case of  $\gamma$ -ray irradiated glow curves the intensity of lower temperature peak increased with dose whereas that of the higher temperature peak decreased relatively. Unlikely, in the case of carbon ion irradiated phosphor the intensity ratio remains same over a variation in dose. The present phosphor have nearly the same TL sensitivity as that of commercial  $CaSO_4:Dy$  for  $\gamma$ -rays and a more TL sensitivity for the carbon ion beam. The phosphor was tested for its dose linearity over a wider range of doses. The observed glow curve variation and resultant variation in values of trapping parameters with a change in ion beam energy suggest more complex interactions of ion beam within the phosphor at higher energies.

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Yes

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

PhD

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

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yes

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