

Spectroscopic properties of Ho³⁺-doped oxyfluorosilicate glasses for Photonic applications

C.S. Dwaraka Viswanath^{1*}, K. Kiran Kumar², L. Lakshmi Devi¹, and C.K. Jayasankar³

¹Mother Theresa Institute of Engineering and Technology, Palamaner-517 408, India.

²Department of Physics, Annamacharya Institute of Technology and sciences, Tirupati-517 520, India.

³Department of Physics, Sri Venkateswara University, Tirupati-517 502, India

*Corresponding author: dwarakaviswanath@gmail.com

ABSTRACT

The Ho³⁺-doped oxyfluorosilicate glass sample with composition (in mol%) of 41 SiO₂ + 10 Al₂O₃ + 25 LiF + 23 SrF₂ + 1 Ho₂O₃ (hereafter referred as SALfSfHo10) have been synthesized and characterized the absorption and photoluminescence properties. The ultraviolet-visible (a) and near infrared (b) absorption spectrum of the SALfSfHo10 glass was shown in Fig. 1. Optical absorption spectra of prepared glass have been analyzed in the frame work of Judd–Ofelt theory. From this theory the three phenomenological intensity parameters $\Omega_2 = 9.06 \times 10^{-20} \text{ cm}^2$, $\Omega_4 = 4.28 \times 10^{-20} \text{ cm}^2$, $\Omega_6 = 3.12 \times 10^{-20} \text{ cm}^2$ are calculated. In turn by using these three intensity parameters and refractive index values, the radiative properties for various luminescent values have been calculated. The higher magnitude of Ω_2 in the studied glass indicates higher asymmetry around the Ho³⁺ ions. The analyses of the results are comparable with other reported Ho³⁺-doped systems [1,2]. The analysis of the results confirms that the present SALfSfHo10 are useful for the development of photonic devices.

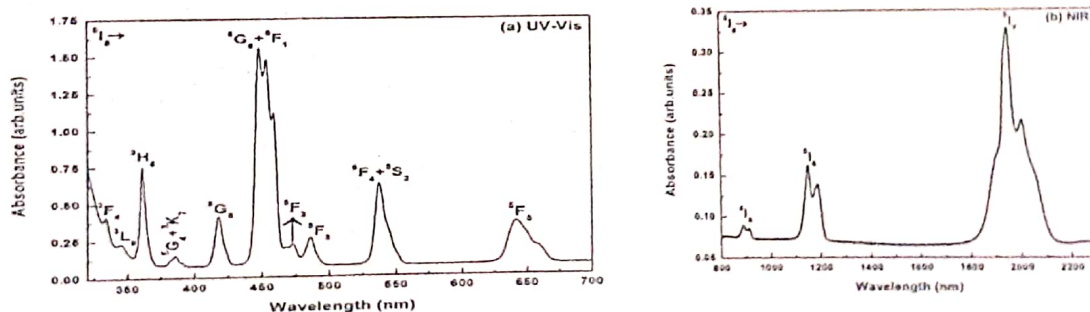


Fig. 1. Absorption spectrum of Ho³⁺ ions in SALfSfHo10 glass in (a) UV-Visible and (b) NIR region.

REFERENCES

- [1] Ch. Srinivasa Rao, K. Upendra Kumar, P. Babu, C. K. Jayasankar, Opt. Mater. 35 (2012) 102.
- [2] S. B. Rai, Spectrochim. Acta A 58 (2002) 1559.

Acknowledgements

The authors are highly thankful to DAE-BRNS, Govt. of India for the sanction of major research project (No.2009/34/36/BRNS/3174, dt.12-02-2010) under MoU between S. V. University, Tirupati and RRCAT, Indore and BARC, Mumbai.

ANNAMACHARYA

INSTITUTE OF TECHNOLOGY & SCIENCES : TIRUPATI
(AUTONOMOUS)

Approved by AICTE, New Delhi & Permanent Affiliation to JNTUA, Anantapuramu,
Accredited by NAAC 'A' Grade & a few Programmes accredited by NBA, New Delhi.



Catalysed and Supported by

NCSTC, DST, Govt. of India, New Delhi through APCOST, Vijayawada

National Conference on

RECENT TRENDS IN SCIENCE, ENGINEERING & TECHNOLOGY (RTSET-19)

(30th - 31th October, 2019)

Certificate

This is to certify that Dr./Mr./Ms./Mrs. C.S. Dwarka Viswanath, MTIET, Palamuru
has participated / Oral / Poster / presented a paper entitled Spectroscopic properties of Ho³⁺-doped
Oxyfluorosilicate glasses for Photonic applications in the National Conference on "RECENT TRENDS IN
SCIENCE, ENGINEERING & TECHNOLOGY (RTSET-19)" is Catalysed and Supported by NCSTC, DST, Govt. of
India, New Delhi through APCOST, Vijayawada organized by Department of Humanities and Basic Sciences, AITS, Tirupati -
517 520, A.P, from 30th - 31st October, 2019.

Dr. P. Chandra Sekhar
Convener

Dr. P. Lavanya
Conference Chair

Dr. C. Nadhamuni Reddy
Principal